

CRITICAL BRIDGE CONSTRUCTION ISSUES









CRITICAL BRIDGE CONSTRUCTION ISSUES - 2008



CONTACT INFORMATION

Rafiq Darji, State Construction Structures Engineer

Phone: (850) 414-4195

E-mail: rafiq.darji@dot.state.fl.us

Steven Plotkin, Construction Structures Engineer

Phone: (904) 360-5501

E-mail: steven.plotkin@dot.state.fl.us



17 Street over ICWW Ft. Lauderdale



Hathaway over St. Andrews Bay Panama City



PURPOSE OF SESSION

- Heighten awareness of widely misunderstood or overlooked specifications and other issues
- Review specifications that were implemented for the first time in recent years
- Introduce upcoming specification changes that will significantly impact Contractor and CEI efforts



Acosta Bridge - Jacksonville, Main Span 630'





MAIN SESSION TOPICS

- Universal Concerns
- Footings
- Bearings
- Beams



US 17 over St. Mary's River, Nassau County

- Decks
- Concrete Materials
- Miscellaneous Topics
- Qualifications, Experience, Training



Main Street - Jacksonville, Lift Span 365





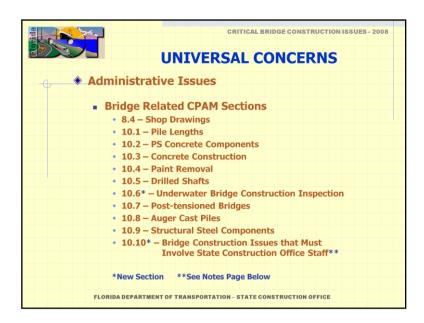
Administrative Issues

- Bridge Related Guidelists
 - 8B Concrete Materials
 - 9 Structure Foundations
 - 10A General Concrete
 - 10B Bearings/Beams/Bolts
 - 10C Bridge Decks
 - 10D Post-Tensioning
 - 11 MSE Walls
 - Guidelist Website:

http://www.dot.state.fl.us/construction/C ONSTADM/guidelist/guideindex.htm



Hal Adams - SR 51 over Suwannee River, Main Span 450'



CPAM 10.10.5, Category 2 (C2) Bridges

Category 2 bridges have a level of complexity that can go beyond the knowledge and experience capability of field staff; therefore, an SCO Bridge Construction Engineer (State Construction Structures Engineer or Construction Structures Engineer) that possesses the knowledge and experience to effectively deal with these complex issues is required in order assist field personnel with resolving a variety of construction issues. Senior Project Engineers or Project Administrators (CEI staff) are required to contact a BCE whenever they have to deal with the issues that follow whether they are construction or design related. The BCE will address construction and design issues directly and make recommendations back to the CEI staff for resolution and, when required, will coordinate the resolution of design issues with the SSDO; therefore, CEI staff is discouraged from contacting the SSDO directly on these issues. BCE's are also available upon request to attend pre-operations or partnering meetings that deal with complex bridge construction operations and issues.

10.10.5.1 Contactor Initiated Changes to Bridge Plans, Shop Drawings, Bridge Related Specifications or Approved Means and Methods Plans

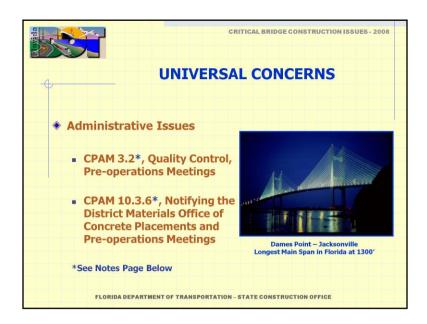
When a Contractor verbally proposes a change to the plans, shop drawings, specifications or means and methods plans (segment erection plans, post-tensioning plan, grouting plans, etc.) for convenience or advantage, a BCE and the Engineer of Record (EOR) should be contacted prior to formal submittal of the proposal by the Contractor, if possible, in order to provide a preliminary response with regard to whether or not the Department will even consider the proposal.

10.10.5.2 Contractor Noncompliance with Bridge Related Contract Documents

When any noncompliance bridge issues occur, a BCE shall be notified as soon as the issue is identified in order to assist in developing proper and consistent action by the Department.

10.10.5.3 Resolution of Bridge Member Damage or Defects

As soon as the damage or a defect is discovered, a BCE shall be notified in order to assist in developing proper disposition by the Department. Disposition may include acceptance as is, rejection of a member or component, or acceptance with corrective action and/or credit. The BCE will make a recommendation to the CEI staff about what action to take; however, final action shall be approved by the District Construction Engineer. The BCE may also choose to attend on-site meetings with the Contractor or with experts involved with resolution of the issue and may choose to personally inspect the damaged or defective work in place.



Pre-operations Meetings - CPAM Section 3.2.7.3 (A) Planning

The Contractor's construction operations can often be very complicated and are usually critical in terms of how much time activities take. When things go wrong or when planning is inadequate, it disrupts the progress of construction and can lead to project delays and claims by the Contractor. In order to reduce the likelihood of inadequate planning, a meeting arranged and chaired by the Project Administrator referred to as a Pre-operations Meeting, should take place between the Department, the CEI Consultant when applicable, the Contractor and any relevant Subcontractors before the Contractor performs a major construction activity or operation for the first time. During this meeting, the Project Administrator should clearly establish lines of communication between project staff members, identify those in authority, assign various responsibilities and develop problem escalation procedures. Where practical, as many Department, CEI Consultant and Contractor personnel as possible who will be directly involved in the activity should attend the meeting. At the meeting, applicable specifications, plans and guidelists should be available for review with the Contractor. A copy of the guidelists should be given out at, or before, the meeting so the Contractor has a written document for future reference and to facilitate an item-by-item review of the guidelists with the Contractor. At the meeting, the applicable specifications should be reviewed with the Contractor and a "What If "discussion should take place with regard to the Contractor's plans if something unexpected happens during the construction operation. All inspectors who will be inspecting the anticipated operation should try to attend the Pre-operations Meeting; however, if they are unable to attend then they should discuss the operation thoroughly with the Project Administrator and the Lead Inspector prior to its start. Pre-operations meetings should always be conducted as described above for major construction operations; however, every effort should be made to have pre-operations meetings for minor construction operations as well. For minor operations, the meetings can be shorter, more informal and can involve fewer participants.

CPAM 10.3.6, Notifying the District Materials Office of Concrete Placements and Pre-operations Meetings

10.3.6.1 Concrete Placements: The Project Administrator shall notify the District Concrete Engineer or designee of the anticipated date and time of a placement whenever there is a cast-in-place (CIP) concrete placement that requires CTQP Qualified Concrete Field Technicians to perform field sampling and testing of concrete. Notification shall be provided at least 48 hours prior to the beginning of the concrete placement whenever possible. This notification is required so that District Materials staff can perform Independent Assurance reviews of field technicians on an annual basis. This notification process is the only efficient way that District Materials Office staff can learn of upcoming concrete placements.

10.3.6.2 Pre-operations Meetings: The Project Administrator shall notify the District Concrete Engineer or designee at least 5 days prior to pre-operations meetings at which Department, CEI, Contractor, concrete producer and other involved personnel discuss the specification requirements and other issues related to a planned first time placement of a significant CIP concrete component for any project (bridge, roadway, drainage, etc.). The District Concrete Engineer or designee will make every effort to attend these meetings in order to be available to provide expert in-person guidance with regard to concrete materials issues. The Project Administrator should strongly encourage the Contractor to invite a representative of the concrete producer to attend the pre-operations meeting.

CRITICAL BRIDGE CONSTRUCTION ISSUES - 2008



UNIVERSAL CONCERNS



Administrative Issues

- Training and Reference Tools (Details on notes page below)
 - CTQP Website contains most structures construction training materials including piles and drilled shafts as downloads
 - English and Spanish Grouting Manuals and English Video available online at SCO website or FDOT Maps and Publications Office
 - Segmental Bridge Construction and Inspection Manuals available in hard copy only from the State Construction Office
 - Structures Related Websites:
 State Construction Office, Structures Webpage
 State Structures Design Office Website



FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE

CTQP website has the following online and Downloadable Materials:

- · Pile Driving Inspector's Tutorial
- · Drilled Shaft Tutorial
- Structures Inspection Part 1, 2 and 3
- Concrete Field Inspector Specification Course Manual
- Website address: http://www.ctqpflorida.com/course_preparation_materials.asp

Grouting Manual and Video

- Hard copy of Manual and Video available at FDOT Maps and Publications Office: http://www.dot.state.fl.us/mapsandpublications/
- Downloadable versions of Manuals at: http://www.dot.state.fl.us/construction/training/training.htm#GroutManual

Segmental Bridge Construction and Inspection Manuals

- A guide to the Inspection of Segmental Bridges (available in hard copy only thru SCO)
- A Guide to Post-Tensioning of Bridges (available in hard copy only thru SCO)
- A Guide to the Construction of Segmental Bridges (available in hard copy only thru SCO)

FDOT Structures Related Websites:

- FDOT State Construction Office, Structures Webpage: http://www.dot.state.fl.us/construction/structures/structures.htm
- FDOT State Structures Design Office Website: http://www.dot.state.fl.us/structures/default.htm

CRITICAL BRIDGE CONSTRUCTION ISSUES - 2008



UNIVERSAL CONCERNS

Technical Issues

- Revision of Spec. 400-21, Disposition of Cracked Concrete: the number of cracks is now taken into account
- Revision of CPAM Section 10.3.5,
 Concrete Crack Inspection: <u>provides</u> <u>instructions for administering</u> <u>Spec. 400-21</u>
- CPAM Section 10.7, Crack and Joint Inspection of Post-Tensioned Bridges
- Guidelist 10A, General Concrete: covers crack inspection (see notes page below)





FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE

INSPECTION OF CRACKS IN CONCRETE – The following Guidelist items cover crack inspection concerns:

Guidelist 10A - CRACK INSPECTION

- 31. Concrete components must have all visible surfaces inspected for cracks on at least the following three occasions: (1) 28 to 31days after a non-precast component has been cast; (2) as soon as possible after the component has been burdened with all dead loads, except for loads from components cast or mounted to the deck, and before Class V finish has been applied; (3) a minimum of 7 complete days after the bridge is fully open to the public for unrestricted use. [Good Practice]
- 32. The width, length, depth and termination points, and precise location of concrete cracks must be properly documented and crack measuring scopes should be used to measure cracks 25 mils wide or less. Documented cracks must be monitored to determine if they are continuing to grow. Immediately report all cracks to the Project Administrator so that their status can be addressed appropriately. [Good Practice]

Pocket Microscope Supplier – Titan Tool Supply, Inc., Phone No.: (716) 873-9907 Web Address -- http://www.titantoolsupply.com/store.asp?pid=11453&catid=19730



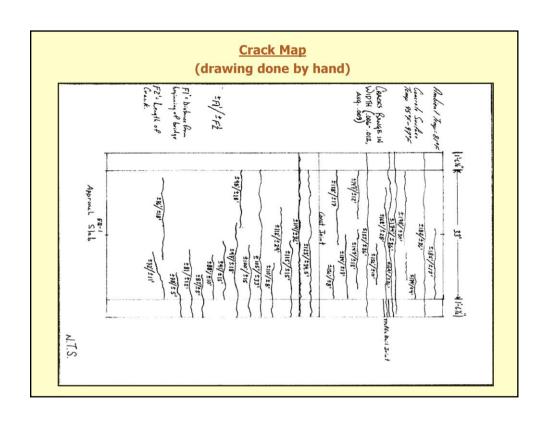
- CPAM Section 10.3.5, Crack Inspection
 - Searching for Cracks
 - 3 cycles: 1) after casting, 2) all dead loads, 3) all live loads
 - Early discovery allows crack monitoring and correction of other components to prevent more cracks
 - Documenting Observations
 - · Crack map: length, width, depth, location, cause
 - Use pocket microscope for cracks 25 mils or less wide
 - Disposition of Cracks
 - Structural or Non-Structural
 - Flow Chart 10-3-5 covers disposition process

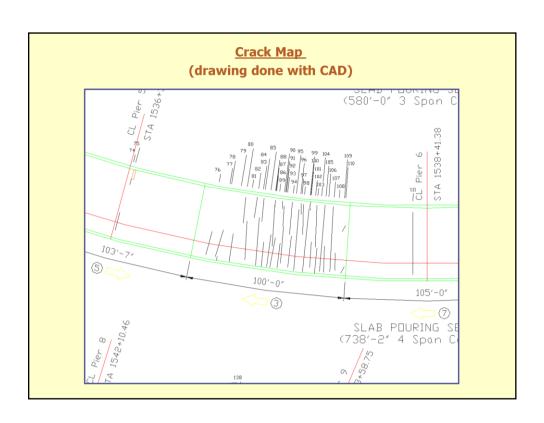


- The new way to determine what correction, if any, needs to be done, to Non-Structural cracks
 - 1) Draw a crack map (width, length, depth, reference points)
 - 2) Identify and dimension the crack LOT
 - 3) Compute the "Cracking Significance"
 - 4) Determine the "Elevation Range"
 - 5) Using crack width, enter Table 1 or 2, Spec. 400-21 to determine the required correction



Methacrylate Application





Re: Bridge Deck Crack Survey (720707)

FIN: 209278-1-52-01

Contract: T2119

Description: SR 9A / SR 202 Interchange

Crack No.	Location UP Sta from FFBW or Const Joint (FT)	Length (FT)	Avg Width	
76	10.0	15.5	0.003	
77	15.9	2.6	0.003	
78	16.9	18.0	0.002	
79	23.4	18.4	0.004	
80	27.4	17.0	0.005	
81	30.7	25.1	0.003	
82	34.9	13.7	0.002	
83	38.1	31.1	0.005	
84	39.2	15.1	0.003	
85	43.0	16.1	0.003	
86	46.7	4.2	0.003	
87	46.7	26.4	0.004	
88	46.8	21.0	0.002	
89	49.9	19.5	0.003	
90	51.5	5.0	0.003	



Bridge Deck Crack Survey (720707) 209278-1-52-01 Re:

FIN:

T2119 Contract:

Description: SR 9A / SR 202 Interchange

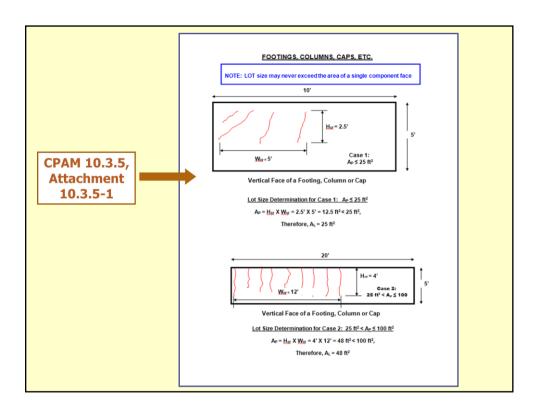
Crack No.	from FFBW or Const Joint (FT)	Length (FT)	Avg Width		
76	10.0	15.5	0.003		
77	15.9	2.6	0.003		
78	16.9	18.0	0.002		
79	23.4	18.4	0.004		
80	27.4	17.0	0.005		
81	30.7	25.1	0.003		
82	34.9	13.7	0.002		
83	38.1	31.1	0.005		
84	39.2	15.1	0.003		
85	43.0	16.1	0.003		
86	46.7	4.2	0.003		
87	46.7	26.4	0.004		
88	46.8	21.0	0.002		
89	49.9	19.5	0.003		
90	51.5	5.0	0.003		

Average Width measured in thousandths of an inch



- The new way to determine what correction, if any, needs to be done, to Non-Structural cracks
 - 1) Draw a crack map (width, length, depth, reference points)
 - 2) Identify and dimension the crack LOT







Ke	Key of Abbreviations and Footnotes for Tables 1 and 2									
Type Abbreviation	Abbreviation	Definition								
	EI	Epoxy Injection (4a)								
Domain Made at	M	Methacrylate (4b)								
Repair Method	NT	No Treatment Required								
	PS	Penetrant Sealer (4b)								
	EA	Extremely Aggressive								
Environment Category	MA	Moderately Aggressive								
	SA	Slightly Aggressive								
Reference Elevation	AMHW	Above Mean High Water								
	-									

Footnotes

- (1) Cracking Significance Range is determined by computing the ratio of Total Cracked Surface Area (TCSA) to Total Surface Area (TSA) per LOT in percent [(TCSA/TSA) x 100] then by identifying the Cracking Significance Range in which that value falls. TCSA is the sum of the surface areas of the individual cracks in the LOT. The surface area of an individual crack is determined by taking width measurements of the crack at 3 representative locations and then computing their average which is then multiplied by the crack length.
- (2) Crack Width Range is determined by computing the width of an individual crack as computed in (1) above and then identifying the range in which that individual crack width falls.
- (3) When the Engineer determines that a crack in the 0.004 inch to 0.008 inch width range is not injectable then for Table 1 use penetrant sealer unless the surface is horizontal, in which case, use methacrylate if the manufacturer's recommendations allow it to be used and if it can be applied effectively as determined by the Engineer.
- (4) (a) Perform epoxy injection of cracks in accordance with Section 411. (b) Seal cracks with penetrant sealer or methacrylate as per Section 413. Use only methacrylate or penetrant sealer that is compatible, according to manufacturer's recommendations, with previously applied materials such as curing compound or paint or remove such materials prior to application.
- (5) Methacrylate shall be used on horizontal surfaces in lieu of penetrant sealer if the manufacturer's recommendations allow it to be used and if it can be applied effectively as determined by the Engineer.

						le 1								
							THER TH							
	[se	ee separ	ate Key	of Abbre			tnotes fo							
	Crack Width	L	Cracking Significance Range per LOT (1)											
Elev.	Range (inch) (2)	Ι.	Isolated			Occasion			Moderat		Severe 6 0.029% or gtr.			
Range	g- (men)	Les	s than 0.	005%	0.00	5% to<0		0.00	% to<0	.029%	0.0	29% or	gtr.	
	x = crack width		Environment Caregory											
		SA	MA	EA	3/4	MA	EA	SA	MA	EA	SA	MA	EA	
	x ≤ 0.004	NT	NT	PS ⁽⁵⁾	NT	PS ⁽⁵⁾	PS ⁽⁵⁾	PS ⁽⁵⁾	PS ⁽⁵⁾				_	
	0.004< x ≤ 0.008	NT	PS ⁽⁵⁾	EI(3)	PS ⁽⁵⁾	EI ⁽³⁾	EI ⁽³⁾	PS ⁽⁵⁾	ı				_	
9	0.008< x ≤ 0.012	NT	PS ⁽⁵⁾	EI								$oxed{oxed}$		
0 to	0.012< x ≤ 0.016	PS ⁽⁵⁾	S(5)											
	0.016< x ≤ 0.020		m			nine App lejection	ropriate							
W [W	0.020< x ≤ 0.024									1.	l			
Elevation: AMHW	0.024< x ≤ 0.028									Reject a	nd Repl	ace		
⊡ <	x > 0.028													
	Crack Width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA	
2	x ≤ 0.004	NT	NT	PS ⁽⁵⁾	NT	PS(5)	PS ⁽⁵⁾	PS(5)	PS ⁽⁵⁾	PS ⁽⁵⁾	PS ⁽⁵⁾			
Elev.: More Than 6 ft 12 ft AMHW	0.004< x ≤ 0.008	NT	PS ⁽⁵⁾	EI(3)	PS ⁽⁵⁾	PS(5)	EI(3)	PS(5)	EI(3)					
E	0.008< x ≤ 0.012	NT	PS ⁽⁵⁾	EI	EI	EI								
Ë×	0.012< x ≤ 0.016	PS(5)	EI	EI	EI						\Box			
Elev.: More T 12 ft AMHW	0.016< x ≤ 0.020	EI												
ΣŽ	0.020< x ≤ 0.024	\Box	Torre	stigate to	Determ	na America				ъ.	ect and	Dania		
ev.	0.024< x ≤ 0.028		_ inve		ir or Rej		priate –			Re	ject and	replace	_	
国旨	x > 0.028			l Acepa	02 Rej	l	_							
	Crack Width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA	
More	x ≤ 0.004	NT	NT	NT	NT	PS ⁽⁵⁾	PS ⁽⁵⁾	PS ⁽⁵⁾	PS ⁽⁵⁾	PS(5)	PS ⁽⁵⁾			
Z >	0.004< x ≤ 0.008	NT	PS ⁽⁵⁾	PS ⁽⁵⁾	PS ⁽⁵⁾	PS(5)	EI(3)	PS ⁽⁵⁾	EI(3)	EI(3)	PS ⁽⁵⁾			
Land or AMHW	0.008< x ≤ 0.012	NT	PS ⁽⁵⁾	EI	EI	EI	EI	EI	EI					
AM	0.012< x ≤ 0.016	PS ⁽⁵⁾	EI	EI	EI	EI	EI							
Over 12 ft	0.016< x ≤ 0.020	EI	EI	EI	EI									
5 2	0.020< x ≤ 0.024	EI												
Elev.: Than	0.024< x ≤ 0.028	\Box	lı	ivestigate						Г.		1.0-1-		
E	x > 0.028			R	epair or	Rejection					Reject an	ıa Repla	ce —	

See a sample of Table 2 on the notes page below

					Tab										
				OF CRA											
	[see sepa	ee separate Key of Abbreviations and Footnotes for Tables 1 and 2]												
			Cracking Significance Range per LOT (1)												
Elev.	Crack Width		Isolated		_	Occasional			Moderate		Severe				
Range	Range (inch) (2)	less than 0.005%			0.005	% to<0.0			7% to<0.0	029%	0.0	29% or	gtr.		
					1		ronment					1			
	x = crack width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA		
•.	x ≤ 0.004	NT	NT	NT	NT	NT	NT	NT	NT	NT					
t 01	$0.004 \le x \le 0.008$	NT	NT	EI/M	NT	NT	EI/M	EI/M	EI/M	EI/M					
Elevation: 12 feet or Less AMHW	$0.008 < x \le 0.012$	NT	NT	EI/M	NT	EI/M	EI/M	EI/M	EI/M						
12 MF	$0.012 \le x \le 0.016$	NT	NT	EI/M	NT	EI/M							ĺ		
/ation: 12 fee Less AMHW	0.016< x ≤ 0.020	EI/M	EI/M	EI	EI										
vati	$0.020 < x \le 0.024$	EI/M	EI	EI			Investigate to Determine				Reject and				
E	$0.024 \le x \le 0.028$	EI/M	EI							eplace					
	x > 0.028							_							
≽	Crack Width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA		
T H	x ≤ 0.004	NT	NT	NT	NT	NT	NT	NT	NT	NT					
AN AN	0.004< x ≤ 0.008	NT	NT	NT	NT	NT	EI/M	NT	EI/M	EI/M					
Over Land or 2 feet AMHW	0.008< x ≤ 0.012	NT	NT	EI/M	NT	NT	EI/M	EI/M	EI/M						
	$0.012 < x \le 0.016$	NT	NT	EI/M	NT	EI/M									
Elevation: O More Than 12	0.016< x ≤ 0.020	NT	EI/M	EI	EI/M										
ig E	0.020< x ≤ 0.024	NT	EI/M	EI		<u> </u>	Investiga				D	eject an	d		
Elevation: [ore Than]	0.024< x ≤ 0.028	NT	EI/M			Ap	propriate	Repair of	Rejection	1		eject and Replace			
Σ.	x > 0.028						I	l	l		Γ_	1	ı —		



- The new way to determine what correction, if any, needs to be done, to Non-Structural cracks
 - 1) Draw a crack map (width, length, depth, reference points)
 - 2) Identify and dimension the crack LOT
 - 3) Compute the "Cracking Significance"
 - 4) Determine the "Elevation Range"



						CONCE		THER TH							
		0 1 777 11		Cracking Significance Range per LOT (1)											
	Elev. Range	Crack Width Range (inch) (2)	Less	Isolated s than 0.	_	Occasional 0.005% to<0.017%				Moderate 0.017% to<0.029%			Severe 0.029% or gtr.		
	Kange	x = crack width					Env	ironment	Catego	ry					
		x - clack width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA	
		x ≤ 0.004	NT	NT	PS(5)	NT	PS(5)	PS(5)	PS(5)	PS(5)					
		0.004< x ≤ 0.008	NT	PS ⁽⁵⁾	EI(3)	PS ⁽⁵⁾	EI(3)	EI(3)	PS ⁽⁵⁾						
	6 ft	0.008< x ≤ 0.012	NT	PS ⁽⁵⁾	EI					ĺ			$\overline{}$		
	0 to 6	0.012< x ≤ 0.016	PS ⁽⁵⁾												
		0.016< x ≤ 0.020		Inv	restigate t		nine App Rejection	ropriate							
	W W	0.020< x ≤ 0.024			Kej I	pair or B	l	1							
	AMI	0.024< x ≤ 0.028									Reject a	nd Repl	ace		
/	Ē Z `	x > 0.028									Ť				
		Crack Width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA	
	9	x ≤ 0.004	NT	NT	PS ⁽⁵⁾	NT	PS(5)	PS ⁽⁵⁾	PS(5)	PS(5)	PS ⁽⁵⁾	PS ⁽⁵⁾	$\overline{}$		
	6 ft	0.004< x ≤ 0.008	NT	PS(5)	EI(3)	PS ⁽⁵⁾	PS(5)	EI(3)	PS(5)	EI(3)					
		0.008< x ≤ 0.012	NT	PS ⁽⁵⁾	EI	EI	EI						$\overline{}$		
	Elev.: More Than 12 ft AMHW	0.012< x ≤ 0.016	PS ⁽⁵⁾	EI	EI	EI									
	More T AMHW	0.016< x ≤ 0.020	EI												
	A A	0 020< x ≤ 0.024	\vdash	T	stigate to	Determi					D.o.	oot on d	Replace		
	Elev.: 12 ft /	0.024< x ≤ 0.028		— inve		ir or Re		priate –			Ke	ject and	replace	_	
	国口	x > 0.028				I	I	_							
\	. /	Crack Width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA	
	Mo	x ≤ 0.004	NT	NT	NT	NT	PS(5)	PS ⁽⁵⁾	PS(5)	PS(5)	PS ⁽⁵⁾	PS(5)			
		0.004< x ≤ 0.008	NT	PS ⁽⁵⁾	PS ⁽⁵⁾	PS ⁽⁵⁾	PS ⁽⁵⁾	EI(3)	PS ⁽⁵⁾	EI(3)	EI(3)	PS ⁽⁵⁾			
	Land o	0.008< x ≤ 0.012	NT	PS ⁽⁵⁾	EI	EI	EI	EI	EI	EI					
	AN	0.012< x ≤ 0.016	PS ⁽⁵⁾	EI	EI	EI	EI	EI							
	Over Land or 12 ft AMHW	0.016< x ≤ 0.020	EI	EI	EI	EI									
		0.020< x ≤ 0.024	EI												
	Elev.: Than	$0.024 < x \le 0.028$ x > 0.028		In In			rmine Ap Rejection	propriate			I	T Reject ar	 1d Repla	ce —	



- The new way to determine what correction, if any, needs to be done, to Non-Structural cracks
 - 1) Draw a crack map (width, length, depth, reference points)
 - 2) Identify and dimension the crack LOT
 - 3) Compute the "Cracking Significance"
 - 4) Determine the "Elevation Range"
 - 5) Using crack width, enter Table 1 or 2, Spec. 400-21 to determine the required correction

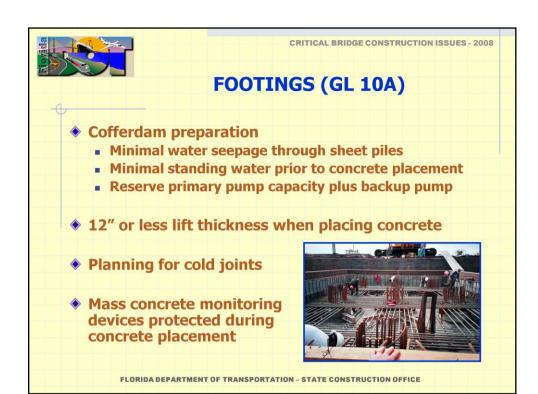


							ole 1							
								THER T						
		[Se	ee separ	ate Key	of Abbre			otnotes fo						
		Crack Width	Cracking Significance Range per LOT (1) Isolated Occasional Moderate Severe								I			
	Elev.	Range (inch) (2)	Lac	Isolated than 0.			Occasion 5% to<0			Moderat % to<0		0.0	Severe 29% or	
	Range		Les	than 0.	00370	0.00		rironment	7		.02976	0.0	2970 01	80.
		x = crack width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA
		x ≤ 0.004	NT	NT	PS ⁽⁵⁾	NT	PS ⁽⁵⁾	PS(5)	PS(5)	PS ⁽⁵⁾	LA	O/A	MEX	LA
		0.004< x ≤ 0.008	NT	PS ⁽⁵⁾	EI(3)	PS(5)	EI(t)	EI(3)	PS(5)	100	1			
	6 ft	0.008< x ≤ 0.012	NT	PS ⁽⁵⁾	EI		-22	2.		•			$\overline{}$	
	9 0	0.012< x ≤ 0.016	PS(5)									$\overline{}$		
	0 to	0.016< x < 0.020		Investigate to Determine Appropriate										
.	W W	0.020< x ≤ 0.024		_	Rej	pair or R	Rejection			$\overline{}$				
	AME	0.024< x ≤ 0.028							-		Reject a	nd Repl	ace	
	ğ Z	x > 0.028						$\overline{}$			t		. –	
ر /		Crack Width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA
	2	x ≤ 0.004	NT	NT	PS ⁽⁵⁾	NT	PS ⁽⁵⁾	PS ⁽⁵⁾	PS(5)	PS ⁽⁵⁾	PS ⁽⁵⁾	PS ⁽⁵⁾	$\overline{}$	
	6 ft to	0.004< n < 0.008	NT	PS(5)	EI(3)	PS ⁽⁵⁾	PS ⁽⁵⁾	EI(3)	PS(5)	EI(3)				
	E (0.008< x ≤ 0.012	N'I	PS(5)	EI	EI >	EI				1		\Box	
	Elev.: More Than 6	0.012< x ≤ 0.016	PS ⁽⁵⁾	EI	EI	EI								
	One	0.016< x ≤ 0.020	EI											
	A. A.	0.020< x ≤ 0.024		_ Inve	stigate to	 Determi	ne Annro	nnriate —		Reject and Replace				
\	lev. 2 n	$0.024 < x \le 0.028$				ir or Rej		_				, cccuna	Lepiuce	
\	ш п	x > 0.028												
\	· /	Crack Width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA
	Mo	x ≤ 0.004	NT	NT	NT	NT	PS(5)	PS(5)	PS(5)	PS ⁽⁵⁾	PS ⁽⁵⁾	PS(5)		
	W W	0.004< x ≤ 0.008	NT	PS(5)	PS ⁽⁵⁾	PS ⁽⁵⁾	PS ⁽⁵⁾	EI(3)	PS ⁽⁵⁾	EI(3)	EI(3)	PS ⁽⁵⁾	-	<u> </u>
	and	$0.008 < x \le 0.012$ $0.012 < x \le 0.016$	NT PS ⁽⁵⁾	PS ⁽⁵⁾ EI	EI EI	EI	EI EI	EI EI	EI	EI	-			
	Over Land or Mo	$0.012 < x \le 0.016$ $0.016 < x \le 0.020$	EI	EI	EI	EI	EI	EI					-	
	Ove 12 f	$0.016 < x \le 0.020$ $0.020 < x \le 0.024$		EI	EI	EI	-	-	_	_	-	—		\vdash
	Elev.: (Than	$0.020 < x \le 0.024$ $0.024 < x \le 0.028$	EI	— _Т	l ovestigate	to Dete	l rmine An	 propriate		_		-		
	Ble Thi	0.024< x ≤ 0.028 x > 0.028		— "			Rejection				1	Reject ar	nd Repla	ce —

Key	Key of Abbreviations and Footnotes for Tables 1 and 2									
Type Abbreviation	Abbreviation	Definition								
	EI	Epoxy Injection (4a)								
Domain Made and	M	Methacrylate (4b)								
Repair Method	NT	No Treatment Required								
	PS	Penetrant Sealer (4b)								
	EA	Extremely Aggressive								
Environment Category	MA	Moderately Aggressive								
	SA	Slightly Aggressive								
Reference Elevation	AMHW	Above Mean High Water								

Footnotes

- (1) Cracking Significance Range is determined by computing the ratio of Total Cracked Surface Area (TCSA) to Total Surface Area (TSA) per LOT in percent [(TCSA/TSA) x 100] then by identifying the Cracking Significance Range in which that value falls. TCSA is the sum of the surface areas of the individual cracks in the LOT. The surface area of an individual crack is determined by taking width measurements of the crack at 3 representative locations and then computing their average which is then multiplied by the crack length.
- (2) Crack Width Range is determined by computing the width of an individual crack as computed in (1) above and then identifying the range in which that individual crack width falls.
- (3) When the Engineer determines that a crack in the 0.004 inch to 0.008 inch width range is not injectable then for Table 1 use penetrant sealer unless the surface is horizontal, in which case, use methacrylate if the manufacturer's recommendations allow it to be used and if it can be applied effectively as determined by the Engineer.
- (4) (a) Perform epoxy injection of cracks in accordance with Section 411. (b) Seal cracks with penetrant sealer or methacrylate as per Section 413. Use only methacrylate or penetrant sealer that is compatible, according to manufacturer's recommendations, with previously applied materials such as curing compound or paint or remove such materials prior to application.
- (5) Methacrylate shall be used on horizontal surfaces in lieu of penetrant sealer if the manufacturer's recommendations allow it to be used and if it can be applied effectively as determined by the Engineer.



SPECIFICATION FOR LIFT THICKNESS WHEN PLACING CONCRETE

400-7.10 Requirements for Successive Layers: Generally, place concrete in continuous horizontal layers, approximately 12 inches [300 mm] thick. To avoid obtaining a plane of separation between batches, do not allow the time before placing the next successive layer to exceed 20 minutes, unless the Engineer determines that adequate fluidity exists in the underlying layer. Generally, leave each layer of concrete unfinished to secure efficient bonding with the overlying layer. To minimize the visibility of joints on exposed faces, finish the top surface of the concrete immediately adjacent to the forms of the exposed face, smoothing with a plaster mason's trowel. Where required, use inset form work to eliminate featheredges and to obtain concrete layers with a minimum thickness of 6 inches [150 mm]. Conduct the operation of depositing and consolidating the concrete so as to form a dense, impervious mass of uniform texture with smooth faces on exposed surfaces. Remove, dispose of, and replace defective concrete as directed by the Engineer and at no expense to the Department.

CRITICAL BRIDGE CONSTRUCTION ISSUES - 2008



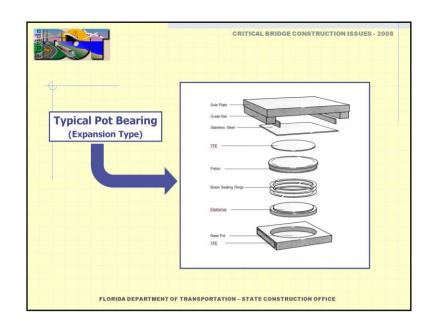
BEARINGS (GL 10B)

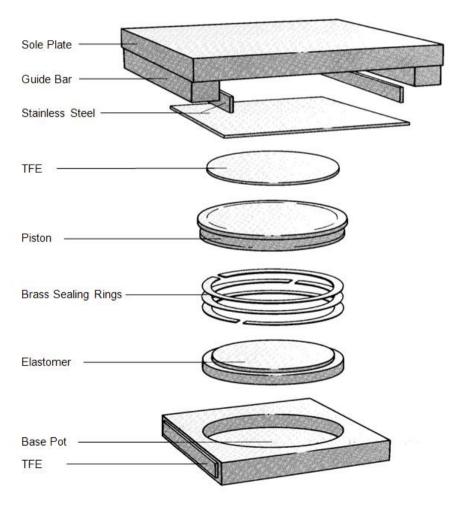
(see notes below for Spec. 460-7.5)

- Distances between beam bearing centerlines should correspond very closely to the substructure bearing centerlines and this should be determined prior to shipping of beams at the fabrication plant
- If there are problems with fit, the Engineer should approve any plan to jack or shift beams once in contact with the bearings and this may require consultation with the EOR
- Beam seats must be scribed with the bearing footprint in order to ensure accurate placement of the bearing on the seat
- Anchor bolt holes must not be relocated without approval of the Engineer and careful supervision of the coring operation
- Beam expansion and contraction caused by temperature must be taken into account when adjusting bearing locations

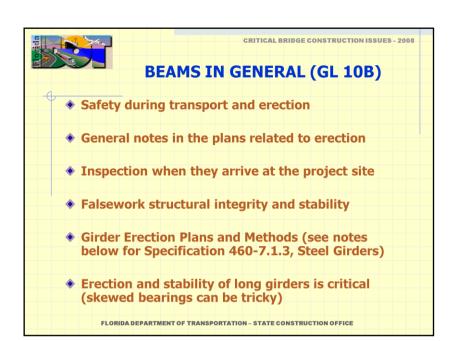
FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE

460-7.5 Preparation of Bearing Areas and Setting of Bearings: Prior to placing superstructure bearing units (including but not limited to neoprene pads and masonry plates), prepare the top of concrete pad (bearing area) in accordance with Section 400. If a discrepancy is identified, report it to the Engineer for resolution. For expansion bearings with slotted holes for anchor rods, which allow movement of the superstructure with respect to the substructure, vary the location of the slotted plate in relation to the anchor rods, in accordance with the prevailing temperature at the time of setting. For fixed bearings at multiple adjacent piers, if necessary, horizontally jack the substructure units to correctly set the centerline of bearing. Adequately account for temperature. Unless specified elsewhere in the contract Documents, locate the theoretical centerline of bearings to within 1/16 inch transverse to longitudinal girder lines; and in the direction parallel to the longitudinal girder line locate the theoretical centerline of bearing within 1/4 inch of the theoretical centerline of bearing. After setting the bearings and installing anchor rod nuts, washers and any other associated hardware specified in the Contract Documents, clean the protruding/exposed surfaces of the assembly of all deleterious material. Finish-coat metal parts in accordance with 460-4.3.4.11.





Typical Pot Bearing (Expansion Type)



GUIDELIST 10B

4. Concerns for all beams: damage or flaws such as kinks, warps, bends, cracks, plates out of plumbness or squareness; pickup points in proper location; producer acceptance stamp, certification and beam identification; proper storage; correct beam lengths prior to shipment; and erect beams at fixed bearings first. [Spec. 460-4 & Good Practice, CPAM 10.2.4]

460-7.1.3 Erection Plan:

Submit, for the Engineer's review, an Erection Plan locating all primary members, lifting equipment and temporary supports or braces, and bolting pattern tightening procedures not considered routine. Ensure that the plan includes the Specialty Engineer's signature and stamp. Include supporting calculations indicating that the design unit stresses indicated in the Contract Documents have not been exceeded. Provide this Plan or Plans to the Engineer three weeks before erecting the piece or pieces. Include the following information in the Erection Plan:

- 1. A plan of the work area showing all substructure units and foundations; surface roads and railroads; all streams, creeks and rivers; and all overhead and underground utilities.
- The erection sequence for all primary load-carrying members and all primary load-carrying member bracing. Note any and all permanent or temporary support and/or bracing locations, including craneholding positions.
- 3. The center of gravity locations, pick weight and delivery orientation for all primary load-carrying members and pick weight.
- 4. Identify any bolting requirements not considered routine.
- 5. Locate all pick crane work points.
- 6. Identify all temporary works and staging areas such as barges, mats and temporary excavation support.
- Provide capacity charts on the drawings for each crane configuration and boom extension utilized.
- 8. Details of all temporary bracing, falsework, towers and shoring.
- 9. Provide any procedures requested by the Engineer and not contained in the Quality Control Plan.



BEAMS IN GENERAL (GL 10B)



- Requirements for construction affecting public safety (see notes page for Spec. 5-1.4.5.6 and 5-1.5.4)
 - Contractor must submit beam stability calculations
 - Must comply with AASHTO Guide for Temporary works
 - Must submit an erection plan including signed and sealed calculations
 - Specialty Engineer must personally inspect erected structure for compliance with plan prior to traffic
 - Contractor must perform daily inspections of erected structure and submit inspection records to Engineer
- Erection must not take place over active traffic (see notes page below for Spec. 5-1.4.5.7)

FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE

5-1.4.5.6 Beam and Girder Temporary Bracing:

For construction affecting public safety, submit calculations for stability for all beams and girders. The Contractor is solely responsible for ensuring stability of beams and girders during all handling, storage, shipping and erection. Adequately brace beams and girders to resist wind or other weather related forces and weight of forms and other temporary loads, especially those eccentric to the vertical axis of the products, considering actual beam geometry and support conditions during all stages of erection and deck construction. Develop the required designs following the AASHTO Guide Design Specifications for Bridge Temporary Works and Construction Handbook for Bridge Temporary Works and the Contract Documents.

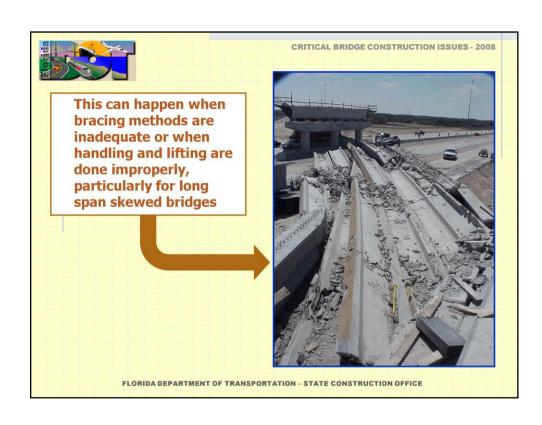
5-1.4.5.7 Erection Plan:

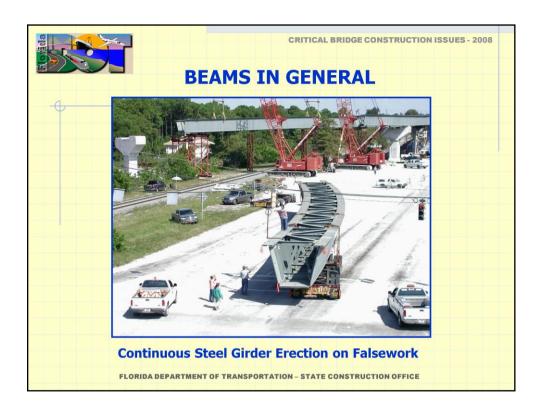
Submit, for the Engineer's review, an Erection Plan that meets the specific requirements of Sections 450, 452 and 460 and this section. The following construction activities are not allowed over the active traffic:

- (a) Beam, girder and segment placement.
- (b) Deck form placement and removal.
- (c) Concrete deck placement.
- (d) Railing construction when railing is located at edge of deck.
- (e) Structure demolition.

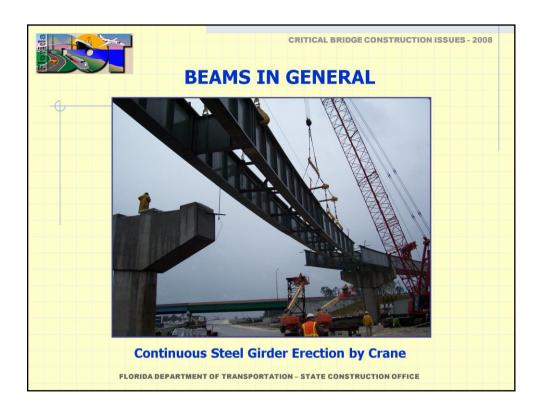
5-1.5.4 Erection:

For Structures affecting public safety, submit an erection plan signed and sealed by the Specialty Engineer to the Engineer at least four (4) weeks prior to erection commencing. Include as part of this submittal signed and sealed calculations and details for any falsework, bracing or other connection(s) supporting the structural elements shown in the erection plan. At least two (2) weeks prior to beginning erection, conduct a Pre-erection meeting with the Specialty Engineer and Engineer to review details of the plan. After erection of the elements but prior to allowing the public below the structure, ensure that the Specialty Engineer has personally inspected the erected member(s) and certified to the Engineer that the structure has been erected and constructed in accordance with its signed and sealed erection plan. Perform daily inspections of the erected structural members until completion of the deck concrete placement. Provide written documentation of the inspections to the Engineer within 24 hours of the inspection.















Good Example of PS Beam Erection & Bracing System

CRITICAL BRIDGE CONSTRUCTION ISSUES - 2008



CONCRETE BEAMS (GL 10B)

Excessively thick beam buildups are a serious problem

- Adds extra dead load that was not accounted for in the design thus reducing the strength of the bridge
- Wastes concrete: sometimes in very large quantities
- Can reduce or eliminate engagement of beam stirrups into deck which greatly reduces lateral impact resistance

Solutions to the problem

- Awareness of beam camber values while beams are in storage at the prestressed plant (see notes page below for specification requirements)
- This awareness may allow cap or beam seat elevations to be raised in time to avoid excessive buildups
- Stirrups can be bent up or inverted hat shaped rebars can be added
- Finished deck grades can be lowered



FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE

450-16.2

Measure and record the sweep and camber of beams monthly. Keep the measurement records on file for review at any time by the Engineer, and upon request, transmit a copy of these measurements to the Engineer. If the camber exceeds by 1 inch the design camber shown in the plans, , take appropriate actions in accordance with 400-7.13.1 to accommodate the product in the structure.

If the sweep exceeds the tolerance specified, take immediate measures to bring the sweep of the product back to within tolerance.

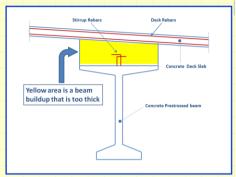
Notify the Engineer immediately when the sweep or camber exceeds the specified tolerances. Special storage conditions for the purpose of removing excessive sweep will not be restricted by requirements of this Subarticle nor contained in 450-2.1. If the sweep of the product exceeds the tolerance specified and cannot be removed, the disposition of the product will be in accordance with 450-12.1 and 450-14.



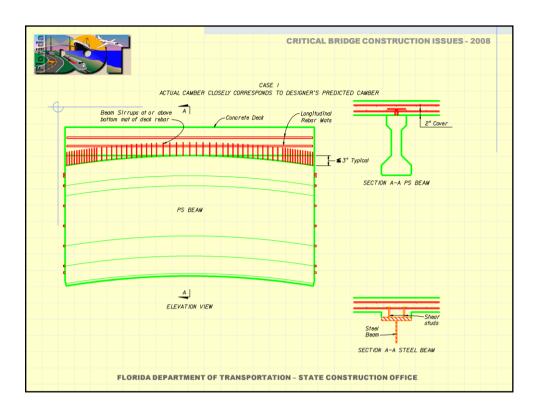


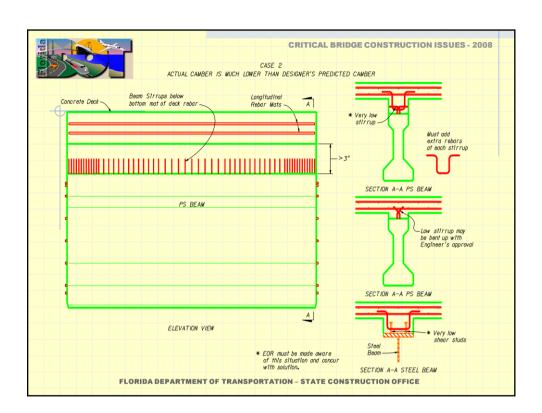
CONCRETE BEAMS (GL 10B)

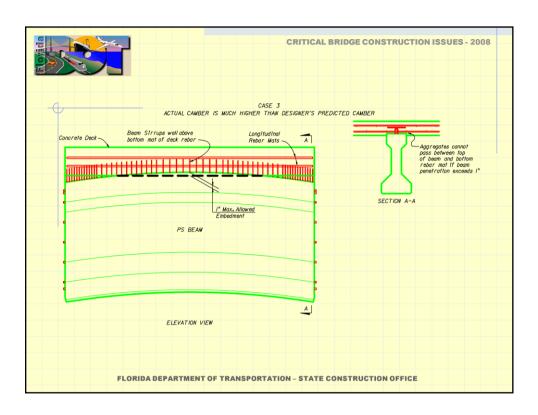
- Observe the distance between the top of beam and top of deck form (slab bottom) at the start of the forming operation
- Most of the stirrup rebars should extend to or be above the bottom mat of deck rebars
- If most bars do not extend at least to the bottom of the deck slab then a correction is required

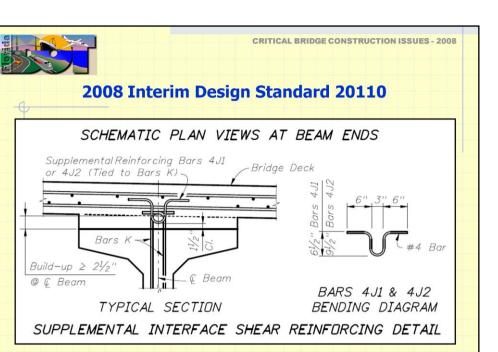


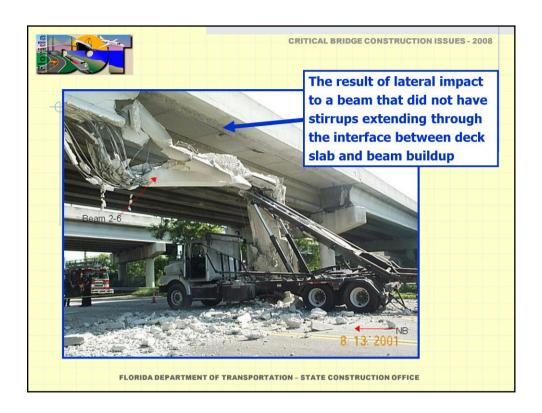
Beam cross section showing an excessively thick beam buildup











CRITICAL BRIDGE CONSTRUCTION ISSUES - 2008



STEEL BEAMS (GL 10B)

- Shear stud installation in field versus plant (see notes page below for new specification)
- Welding of Stay-In-Place form straps on top of girder flanges (see notes page below for specification)
- Metal hardware for forms or other accessories <u>must not</u> be welded to structural steel unless approved by the Engineer
 - Improper welding can cause imperfections in the steel that may lead to fatigue damage or failure
 - May be permitted if welding is the same as for shear studs installed in the field



FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE

Specification 502-1 Description

Furnish and install welded shear connectors on steel beams and girders at locations shown in the Contract Documents. Field weld shear connectors located on the top flange of girders only after the deck forms are in place. However, if workers that walk on the top flange of erected girders have 100% fall protection in full compliance with Federal Occupational Safety and Health Administration Standards then shear connectors located on the top flange of girders may be furnished and installed in the Fabrication plant.

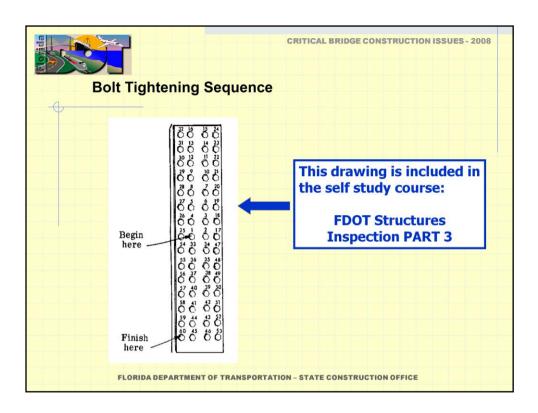
Specification 400-5.5.7.1, Stay-In-Place Metal Forms

Protect structural steel components from damage by using a shield to guard against weld splatter, weld overrun, arc strikes, or other damaging effects of the welding process. Upon completion of welding, rest the metal form support flush on the supporting steel component. Should any weld spatter, weld overrun, arc strike, or other effects of the welding process be evident or occur to the structural steel component, immediately stop in-place welding of the metal form supports for the remainder of the work. In this event, weld all metal form supports off of the structure and erect the forms after prefabrication, or use an alternate approved method of attaching the form supports. Remove improper weldment, repair the supporting steel component for any improper welding. Perform all required verification and testing at no expense to the Department and to the satisfaction of the Engineer.

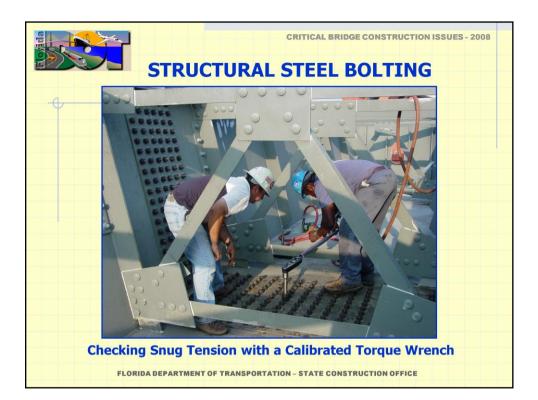


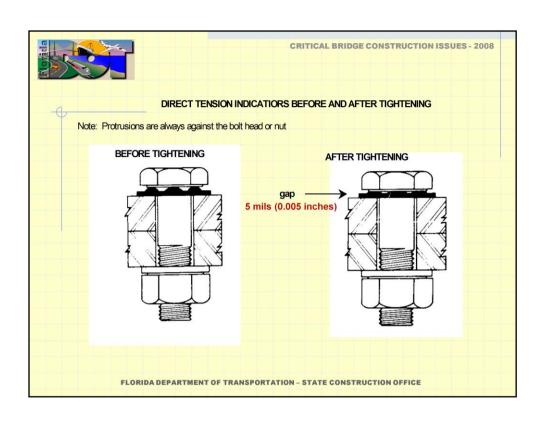
460-5.2.1 Rotational Capacity (RC) Tests

At the location of and prior to installation of permanent high-strength fasteners in main or primary load-carrying member connections, perform RC tests in accordance with Florida Method FM 5-581 (for long bolts) or FM 5-582 (for short bolts) to ensure that the fasteners are capable of developing the specified strength and that the fasteners are properly lubricated. As a minimum, test two assemblies per LOT designation. The bolt, nut and washer shall come from the same LOT and be packed in the same container (or group of containers assigned the same LOT), except in special cases where nuts and washers have only one production LOT number for each size. Short bolts may also be tested using FM 5-583 with DTI's calibrated with long bolts installed in a Tension Measuring Device. Washers are required for RC tests even though they may not be required for jobsite installation. Where washers are not required for jobsite installation, LOT identification is not required. The washer coating shall be the same as that for the bolt and nut. Perform the RC test in a manner that replicates the anticipated fastener installation the technique (e.g. If a spud wrench is to be used as a part of the installation process, use the wrench similarly for the RC test.). If any of the required tests fails, the entire LOT will be rejected.

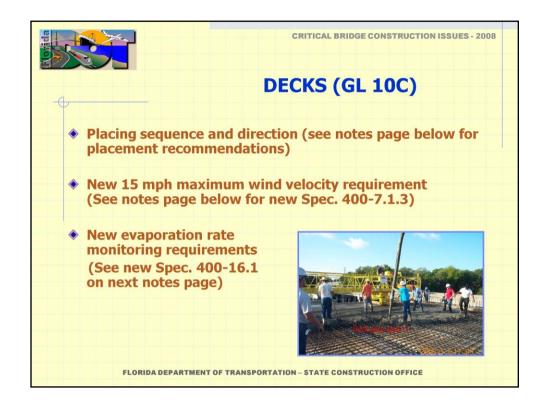










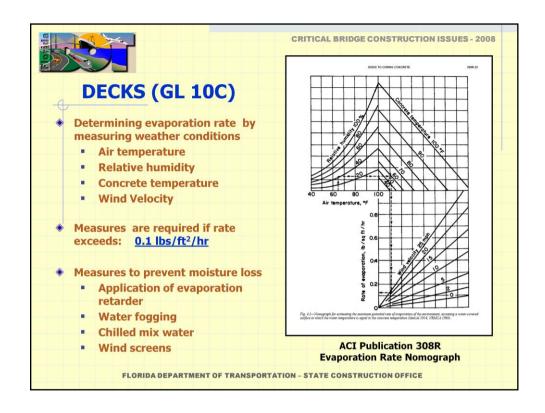


DECK PLACEMENT DIRECTION RECOMMENDATATIONS

Whenever possible, deck placements that have one end that will be in contact with the face of a previously placed deck section that is cured and hard (cold joint), should begin at the end opposite the cold joint. This procedure should prevent uncontrolled tension cracks from forming in the top of the deck in the vicinity of the cold joint. The reason for this is that the beam ends rotate as the plastic deck concrete load is imposed. By ending the placement at the cold joint instead of beginning at the cold joint, all the beam end rotation generated by the concrete load will have taken place and thus tensio

400-7.1.3 Wind Velocity Restrictions:

Do not place concrete for bridge decks if the forecast of average wind velocity at any time during the planned hours of concrete placement exceeds 15 mph. Obtain weather forecasts from the National Weather Service "Hourly Weather Graph" for the city closest to the project.



400-16.1 General:

Cure cast-in-place and precast (non-prestressed) concrete as required herein for a minimum duration of 72 hours. If forms are loosened or removed before the 72 hour curing period is complete, expand the curing to cover these surfaces by either coating with curing compound or extending the continuous moist cure area.

Until curing has begun, retain concrete surface moisture at all times by maintaining a surface moisture evaporation rate less than 0.1 lb/ft2/hr. Periodically, at the site of concrete placement prior to and during the operation, measure the ambient air temperature, relative humidity and wind velocity with industrial grade weather monitoring instruments to determine the on-site evaporation rate. If the evaporation is, or is likely to become 0.1 lb/ft2/hr or greater, employ measures to prevent moisture loss such as application of evaporation retarder, application of supplemental moisture by fogging or reduction of the concrete temperature during batching. Compute the evaporation rate by using the nomograph in the ACI manual of Concrete Practice Part 2, Section 308R Guide to Curing Concrete, or by using an evaporation rate calculator approved by the Engineer.



DECKS

Free evaporation rate calculator available on the web from Arizona State University:

http://construction.asu.edu/cim/cimasu1/curing/curingfirstpage.htm

State Construction Office, Structures website also has link to this site under "Technical Notices"

		_
ovida 	CRITICAL BRIDGE CONSTRUCTION ISSUES - 2008	
<u> </u>	Evaluating Concrete Curing Conditions	
	Developed By : Luke Snell And Aamir Munir	
	Cracking is expected Precautions against plastic shrinkage are mandatory The Rate Of Evaporation is 0.44 lb/Sq. ft/h and is controlled by the following four values.	
	Air Temperature : 65 F Concrete Temperature : 80 F Humidity : 25 % Wind Velocity : 20 mph Windy Winter Day	
	Please Enter the Correct Values: 1. Air Temperature in F : [65 (Temp Range 40 to 99 F)	
	2. Humidity in %age :25 (Humidity Range 0 to 99 %)	
	3. Concrete Temperature in F: 80 (Temp Range 40 to 99 F)	
	4. Wind Velocity in MPH : 20 (Wind Velocity 1 to 25 MPH)	
	Submit Redo Help	
	Air Temperature Computer Change	
	FLORIDA DEPARTMENT OF TRANSPORTATION – STATE CONSTRUCTION OFFICE	

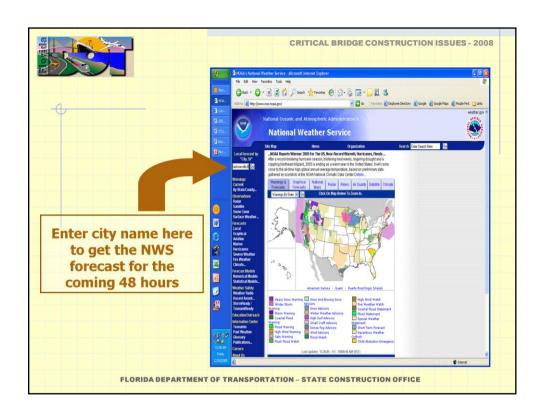
Con da	CRITICAL BRIDGE CONSTRUCTION ISSUES - 2008	
	Evaluating Concrete Curing Conditions	
	Developed By : Luke Snell And Aamir Munir	
	Some shrinkage cracking can occur The Rate Of Evaporation is 0.19 lb/Sq. ft/h and is controlled by the following four values.	
	Air Temperature : 90 F Concrete Temperature : 95 F Humidity : 65 % Wind Velocity : 10 mph Summer Day	
	Please Enter the Correct Values: 1. Air Temperature in F :90 (Temp Range 40 to 99 F)	
	2. Humidity in %age :65 (Humidity Range 0 to 99 %6)	
	3. Concrete Temperature in F: 95 (Temp Range 40 to 99 F)	
	4. Wind Velocity in MPH : 10 (Wind Velocity 1 to 25 MPH)	
	Submit Redo Help	
	Air Temperature Computer Change	
	FLORIDA DEPARTMENT OF TRANSPORTATION – STATE CONSTRUCTION OFFICE	



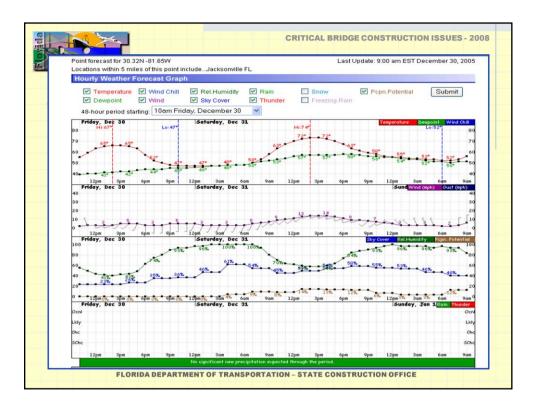


DECKS

- Weather forecasts must be obtained from the National Weather Service website http://www.nws.noaa.gov
- Input the name of the city closest to the project site
- Under "Additional Forecasts and Information" select "Hourly Weather Graph" to get the forecast for the next 48 hours







CRITICAL BRIDGE CONSTRUCTION ISSUES - 2008



DECKS (GL 10C)

- - Application of water after screeding (see notes page below for Spec. 400-7.13.3)
 - With regard to applying curing compound, the following must be reported to the Engineer (see notes page below for Spec. 400-16):
 - How the curing compound spread rate will be determined
 - The actual curing compound quantity applied during the operation
 - Compound must be placed under barrier footprint
 - Placement and maintenance of curing blankets (over barrier)
 - Planing and grooving for long and and short bridges (Spec. 400-15.2.5.1 thru 6)



FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE

400-7.13.3 Screeding Operations: <u>Do not add water to the concrete surface to assist in finishing operations unless specifically authorized by the Engineer. If the Engineer permits the addition of water, apply only a fog mist, above the concrete surface, by means of approved power driven spray equipment approved by the Engineer.</u>

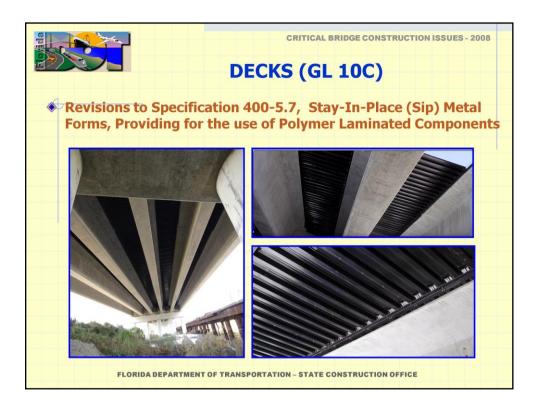
400-15.2.5.3 Plastic Finish and Surface Finish for Long Bridges: Do not moisten, manually float or apply texture to the concrete surface after the screed, with attached smoothing device, has passed unless correction of isolated surface irregularities is warranted and this should be done as soon as possible after screeding while the concrete is plastic. Correct all flaws such as cavities, blemishes, marks, or scratches that will not be removed by planing.

If the Engineer permits the addition of water when correcting flaws, apply moisture to the concrete surface only if required and only in the immediate vicinity of the isolated irregularity. Apply a quantity of moisture not greater than what is needed to facilitate correction of the irregularity and apply only a fog mist, above the concrete surface, by power driven spray equipment approved by the Engineer.

400-16.2 (b) Membrane Curing Compound: Apply a white Type 2 curing compound to all surfaces at a uniform coverage as recommended by the manufacturer but not less than 0.06 gal/yd² (1 gal/150 ft²).

400-16.4 Bridge Decks: Cure bridge decks for a duration of seven days. Immediately after finishing and before the concrete surface moisture evaporates, apply a membrane curing compound to the deck top surface in accordance with 400-16.2 using a compressor driven sprayer. In general, apply curing compound to concrete decks only when the surface is damp and before all surface moisture evaporates and do not apply curing compound to a surface with standing water. For Short bridges, begin applying curing compound immediately after the initially placed concrete has been floated, straightedged, textured and a damp surface condition exists and continue applying compound as concrete placement progresses with as little interruption as possible until the entire deck surface has been coated with compound. For Long bridges, begin applying curing compound to the initially placed concrete as soon as a damp surface condition exists and continue applying compound as concrete placement progresses with as little interruption as possible until the entire deck surface has been coated with compound. However, for both Short and Long bridges, the elapsed time between the initial placement of deck concrete and the completed application of curing compound must not exceed 120 minutes. The 120 minute limit may be extended by the Engineer if project specific factors (cool temperatures, high humidity, retarding admixtures, etc.) are prolonging wet surface conditions.

Prior to the first deck placement, submit to the Engineer the method that will be used to periodically measure the gallons of curing compound applied as the deck placement progresses. Prior to the placement of each deck, submit to the Engineer the anticipated quantity of curing compound in gallons along with the corresponding square feet of deck to be covered to meet the coverage rate in 400-16.2. Compute the actual quantity of curing compound applied at the conclusion of each deck placement and submit the quantity to the Engineer. Apply the curing compound from a work platform.



400-5.7 Stay-In-Place Metal Forms:

400-5.7.1 General: Utilization of stay-in-place metal forms is permitted in lieu of removable forms to form concrete bridge decks between beams and between the webs of individual box girders when designated in the plans. Stay-in-place metal forms may be of the cellular or non-cellular type, however, do not use cellular type forms when polymer sheeting is required. The flutes of non-cellular stay-in-place metal forms may be filled with polystyrene foam or concrete. When polystyrene foam is used to fill the forms, fill form flutes completely; do not allow any portion of the polystyrene foam to extend beyond the limits of the flutes. Ensure that the polystyrene foam remains in its required position within flutes during the entire concrete placement process. Do not use reinforcing steel supports or other accessories in such a manner as to cause damage to the polystyrene foam. Replace all damaged polystyrene foam to the satisfaction of the Engineer.

When the bridge superstructure environment is classified as moderately or extremely aggressive due to proximity to saltwater, apply polymer sheeting to the entire exterior surface of stay-in-place metal forms, except that the exterior surface of stay-in-place metal forms used to form the area between the webs of individual box girders does not require polymer sheeting. When polystyrene foam is used to fill the flutes of stay-in-place metal forms, apply polymer sheeting on the entire inside surface for all environmental classifications. When the flutes are concrete-filled, polymer sheeting is not required on the inside surface of the stay-in-place metal forms. Use polymer sheeting materials and application methods as described herein.

Prior to using stay-in-place metal forms, submit detailed plans for approval of the forming system, including method of support and attachment and method of protecting the supporting structural steel components from welding effects. Submit design calculations for the forming system, which have been signed and sealed by the Specialty Engineer. Detail stay-in-place metal forms such that they in no way infringe upon the concrete outline of the slab shown on the plans. Use stay-in-place metal forms that provide and maintain the dimensions and configuration of the original slab in regards to thickness and slope.

Do not weld stay-in-place metal form supports and connections to the structural steel components. Do not connect polymer coated angles or other hardware that support polymer coated metal forms to the beam attachment straps or clips by welding.

Protect structural steel components from damage by using a shield to guard against weld splatter, weld overrun, arc strikes, or other damaging effects of the welding process. Upon completion of welding, rest the metal form support flush on the supporting steel component. Should any weld spatter, weld overrun, arc strike, or other effects of the welding process be evident or occur to the structural steel component, immediately stop in-place welding of the metal form supports for the remainder of the work. In this event, weld all metal form supports off of the structure and erect the forms after prefabrication, or use an alternate approved method of attaching the form supports. Remove improper weldment, repair the supporting steel component for any improper welding. Perform all required verification and testing at no expense to the Department and to the satisfaction of the Engineer.

Do not use stay-in-place metal forms until the forming system has been approved by the Engineer. The Contractor is responsible for the performance of the stay-in-place forms.

DECKS (GL 10C)

There will now be 4 types of SIP form systems:

(1) Galvanized with no polymer coating

(2) Galvanized with polymer coating on the form top only

(3) Galvanized with polymer coating on the form bottom only

(4) Galvanized with polymer coating on both sides of the form

400-5.7.1 General: Continued from previous notes page

Structures designed, detailed, and dimensioned for the use of removable forms: Where stay-in-place metal forms are permitted, the Contractor is responsible and shall obtain the approval of the Engineer for any changes in design, etc. to accommodate the use of stay-in-place forms. The Engineer will compute pay quantities of the various components of the structure which are paid on a cubic yard basis from the design dimensions shown on the plans with no allowance for changes in deflection or dimensions necessary to accommodate the stay-in-place forms or concrete to fill the form flutes. The Engineer will limit pay quantities of other Contract items that the Contractor increases to accommodate the use of stay-in-place forms to the quantity required for the original plan design.

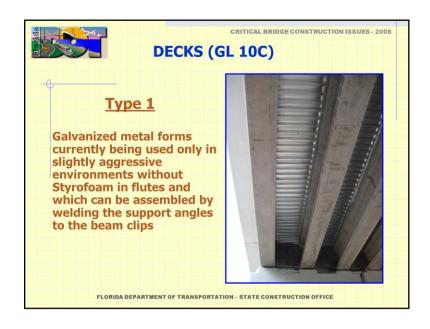
Submit all changes in design details of bridge structural members that support stay-in-place forms, showing all revisions necessary to enable the supporting components to withstand any additional weight of the forms and the weight of any extra concrete that may be required to fill the forms. Include with the design calculations a comparative analysis of the stresses in the supporting components as detailed on the Contract plans and as modified to support the forms. Use the identical method of analysis in each case, and do not allow the stresses in the modified components to exceed those of the component as detailed in the Contract plans. Include with the design the adjusted cambers for any changes in deflection over those shown on the original plans. Modify the beams to provide additional strength to compensate for the added dead loads imposed by the use of stay-in-place forms. Obtain the additional strength by adding strands to the pre-stressed beams or by adding steel material to increase the section modulus of steel girders. Substantiate the added strength by the comparative calculations. Do not use stay-in-place forms until the forming system and all necessary design revisions of supporting members have been approved by the Engineer.

Structures designed, detailed, and dimensioned for the use of stay-in-place metal forms:

Prior to using stay-in-place metal forms, submit detailed plans for approval of the forming system (including method of support and attachment) together with design calculations. Include an analysis of the actual unit weight of the proposed forming system over the projected plan area of the metal forms. If the weight thus calculated exceeds the weight allowance for stay-in-place metal forms and concrete required to fill the forms shown on the plans, then modify the supporting components to support the excess weight as specified by the Contractor's Specialty Engineer.

For all structures utilizing structural steel supporting components, paint the vertical sides of the top flange prior to installation of the stay-in-place metal forms in accordance with Section 560.

For non-polymer sheeting form surfaces, use zinc paint coating in accordance with Section 562 to all accessories cut from galvanized sheets, which are not embedded in concrete.



400-5.7.2 Design: Meet the following criteria for the design of stay-in-place bridge deck forms:

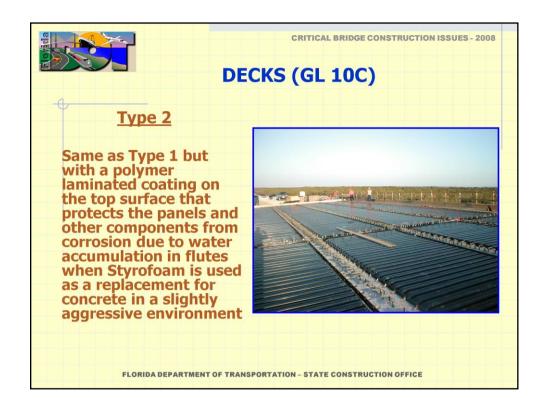
- 1. Design the forms on the basis of dead load of form, reinforcement, and plastic concrete plus 50 lb/ft² for construction loads. Use a unit working stress in the steel sheet of not more than 0.725 of the specified minimum yield strength of the material furnished, but not to exceed 36,000 psi.
- 2. Do not allow deflection under the weight of the forms, reinforcement, and plastic concrete to exceed 1/180 of the form span or 1/2 inch, whichever is less, for form spans of 10 feet or less, or 1/240 of the form span or 3/4 inch, whichever is less, for form spans greater than 10 feet. In all cases, do not use a loading that is less than 120 psf total.
- 3. Use a design span of the form equal to the clear span of the form plus 2 inches. Measure the span parallel to the form flutes.
- 4. Compute physical design properties in accordance with requirements of the AISI Specifications for the Design of Cold Formed Steel Structural Members, latest published edition.
- 5. For all reinforcement, maintain the design concrete cover required by the plans.
- 6. Maintain the plan dimensions of both layers of primary deck reinforcement from the top surface of the concrete deck.
- 7. Do not consider the permanent bridge deck form as lateral bracing for compression flanges of supporting structural members.
- 8. Do not use permanent steel bridge deck forms in panels where longitudinal deck construction joints are located between stringers.
- 9. Secure forms to the supporting members by means other than welding directly to the member.

400-5.7.3 Materials:

400-5.7.3.1 Metal Forms: Fabricate stay-in-place metal forms and supports from steel meeting the requirements of ASTM A653 having a coating designation G165. Do not use form materials that are less than 0.03 inch uncoated thickness.

400-5.7.3.2 Polymer Sheeting: Use polymer sheeting comprised of at least 85% ethylene acrylic acid copolymer capable of being applied to both G165 and G210 steel sheet as described in ASTM A742. Ensure that the polymer sheeting has a nominal thickness of 12 mils as manufactured and a minimum thickness of 10 mils after lamination to the steel sheet. Ensure that the polymer sheeting remains free of holes, tears and discontinuities and sufficiently flexible to withstand the forming process without any detrimental effects to durability or performance. Ensure that the polymer sheeting is UV stabilized and contains antioxidants. Ensure that the as-manufactured polymer sheeting (prior to application) has an Oxidative Induction Time (OIT) of 60 to 75 minutes at 170 °C in air when tested according to ASTM D3895. Perform additional OIT tests on samples taken from the finished product (polymer sheeting applied to forms) resulting in a minimum OIT according to ASTM D3895 of 32 minutes at 170 °C in air. Ensure that the polymer sheeting adheres to galvanized metal sufficient to prevent undercutting at penetrations made through the polymer sheeting or metal forms to the satisfaction of the Engineer. Ensure that edges subjected to shear cutting are coated by the form manufacturer with two coats of a compatible liquid coating repair material before delivery to the site. Ensure that steel used to produce polymer laminated metal forms is appropriately cleaned and prepared per NCCA (National Coil Coating Association) standard continuous coil coating practices. Ensure that pretreatment for use in conjunction with the manufacturer's polymer sheeting material is approved as compatible by the polymer sheeting manufacturer. Apply pretreatment in accordance with the polymer sheeting manufacturer's procedures. Apply polymer sheeting in accordance with the manufacturer's recommendations and procedures. Ensure that all steel has the polymer sheeting applied prior to fabrication of the stay-in-place forms and accessories.

Ensure that the screws to be used in the fastening of the stay-in-place laminated metal forms have a corrosion resistant cladding that will not have an adverse effect to the system due to the contact of dissimilar metals.



400-5.7.3.3 Certification: Provide a written certification from the manufacturer stating the product meets the requirements of this specification along with the delivery of the coated forms to the job site. Ensure that the certification conforms to the requirements of Section 6. Ensure that the manufacturer has a quality control program conforming to ISO 9001:2000 standards.

400-5.7.3.4 Polystyrene Foam: Use polystyrene foam comprised of expanded polystyrene manufactured from virgin resin of sufficient density to support the weight of concrete without deformation. Extrude the polystyrene foam to match the geometry of the flutes and provide a snug fit. Use polystyrene foam that has a density of not less than 0.8 lbs/cubic foot. Use polystyrene foam that has water absorption of less than 2.6% when tested according to ASTM C272. Provide a written certification from the manufacturer stating the product meets the requirements of this Specification along with the delivery of the product.

400-5.7.4 Construction: Install all forms in accordance with approved fabrication and

Do not rest form sheets directly on the top of the stringer of floor beam flanges. Fasten sheets securely to form supports, and maintain a minimum bearing length of 1 inch at each end for metal forms. Place form supports in direct contact with the flange of the stringer or floor beam. Make all attachments for coated metal forms by bolts, clips, screws, or other approved means.

erection plans.

400-5.7.4.1 Form Galvanizing Repairs: For any permanent exposed steel where the galvanized coating has been damaged, thoroughly clean, wire brush, and paint it with two coats of galvanizing compound in accordance with Section 975 to the satisfaction of the Engineer. Do not touch up minor heat discoloration in areas of welds.



400-5.7.4.2 Polymer Sheeting Repairs: Inspect and identify areas for damage to the polymer sheeting and repair with liquid polymer coating similar and compatible with respect to durability, adhesion and appearance in accordance with ASTM A762, as furnished by the stay-in-place form manufacturer. Ensure that the inspection includes checking the polymer sheeting for cuts, tears, cracking, surface pits, peeling, dirt, grease, oil, stains, rust or bare areas. Reject any panels that show coating blistering, peeling or cracking. Repair all polymer sheeting damage according to the following:

a. Surface Preparation: Ensure that all surfaces to be repaired are clean and free of any deleterious substances. Remove all traces of dirt, soil, oil deposits, greases, and other surface contaminates in accordance with the polymer sheeting and coating manufacturer's written specifications prior to touch-up and recoating.

b. Application Procedures: Ensure that the liquid polymer repair coating is applied to a clean dry surface and in accordance with the manufacturer's written specifications. Apply the repair coating using a suitable paintbrush or other means acceptable to the Engineer. Apply a first coat of product to the surface at 2-4 mils in thickness. Let the first coat air dry. Apply a second coat to form a complete layer and increase the thickness, immediately after verifying the first coat is dry to the touch (15 - 25 minutes depending on the local air drying temperature and atmospheric conditions). Apply the second coat at the same coating thickness as the first at 2-4 mils. Ensure that the total dry film thickness of the two coats is not less than 6 mils. Apply additional coats in this same manner until desired coating thickness is achieved.

400-5.7.5 Placing of Concrete: Vibrate concrete to avoid honeycomb and voids, especially at construction joints, expansion joints, valleys and ends of form sheets. Use approved pouring sequences. Do not use calcium chloride or any other admixture containing chloride salts in the concrete.



400-5.7.6 Inspection: The Engineer will observe the Contractor's method of construction during all phases of the construction of the bridge deck slab, including the installation of the metal form system; location and fastening of the reinforcement; composition of concrete items; mixing procedures, concrete placement, and vibration; and finishing of the bridge deck. Should the Engineer determine that the procedures used during the placement of the concrete warrant inspection of the underside of the deck, remove at least one section of the metal forms in each span for this purpose. Do this as soon after placing the concrete as practicable in order to provide visual evidence that the concrete mix and the procedures are obtaining the desired results. Remove an additional section in any span if the Engineer determines that there has been any change in the concrete mix or in the procedures warranting additional inspection.

If, in the Engineer's judgment, inspection is needed to check for defects in the bottom of the deck or to verify soundness, sound the metal forms with a hammer as directed by the Engineer after the deck concrete has been in place a minimum of two days. If sounding discloses areas of doubtful soundness to the Engineer, remove the metal forms from such areas for visual inspection after the concrete has attained adequate strength. Remove metal bridge deck forms at no expense to the Department.

At locations where sections of the metal forms have been removed, the Engineer will not require the Contractor to replace the metal forms. Repair the adjacent metal forms and supports to present a neat appearance and to ensure their satisfactory retention and where they are polymer sheeted, coat all exposed surfaces of stay-in-place metal form system elements that are not coated or are damaged with a field applied liquid polymer coating as specified in 400-5.7.4.2. As soon as the form is removed, the Engineer will examine the concrete surfaces for cavities, honeycombing, and other defects. If irregularities are found, and the Engineer determines that these irregularities do not justify rejection of the work, repair the concrete as directed, and provide a General Surface Finish in accordance with 400-15. If the Engineer determines that the concrete where the form is removed is unsatisfactory, remove additional metal forms as necessary to inspect and repair the slab, and modify the method of construction as required to obtain satisfactory concrete in the slab. Remove and replace all unsatisfactory concrete as directed, at no expense to the Department.

If the method of construction and the results of the inspections as outlined above indicate that sound concrete has been obtained throughout the slabs, the amount of sounding and form removal may be reduced when approved by the Engineer.

Corrosion of assembly screws will not be considered a structural or aesthetic problem and is considered acceptable.

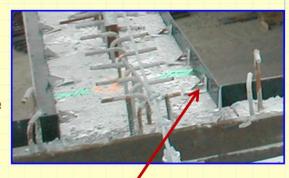
Provide the facilities for the safe and convenient conduct of the inspection procedures.

CRITICAL BRIDGE CONSTRUCTION ISSUES - 2008

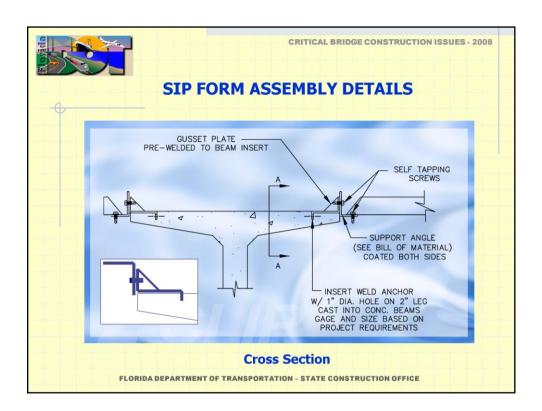


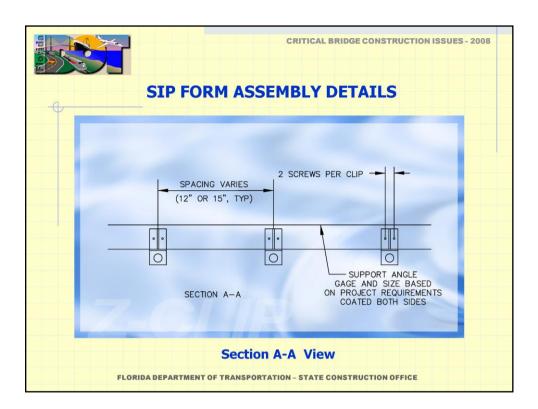
SIP FORM ATTACHMENT DETAILS

For Type 2, 3 and 4 forms, the support angle to beam attachment clip connections cannot be welded but instead must be made with screws, bolts or clips.



Screws Used to Connect Support Angle to Beam Clip

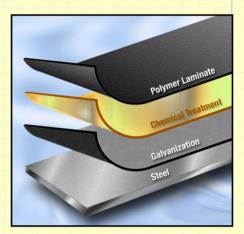






SIP FORM COATING APPLICATION PROCESS

- SIP Components, in the form of sheet steel, are galvanized
- The surface of the galvanizing is chemically treated in order to insure that the polymer laminate adheres to it properly
- The laminate is then applied
- All of this takes place prior to cold forming; however, the laminate is flexible and strong enough to withstand cold forming without reduction in performance or durability

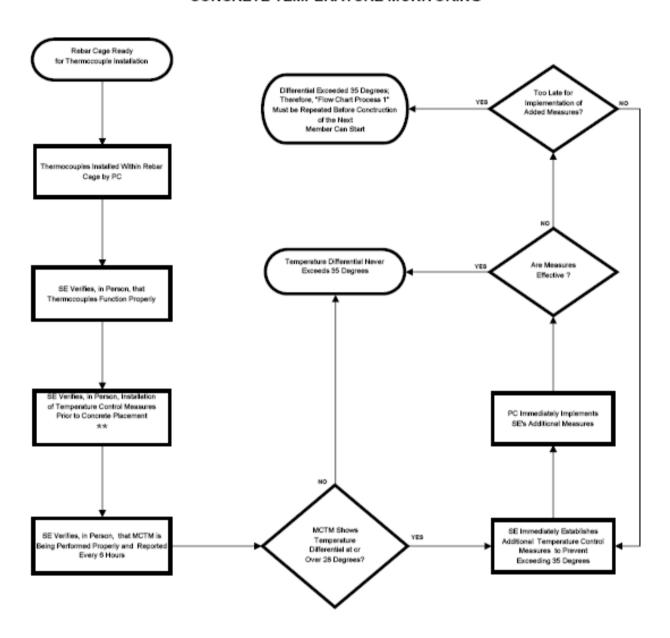




MASS CONCRETE MONITORING SPECIFICATION

346-3.3 Mass Concrete: When mass concrete is designated in the Contract Documents, provide an analysis of the anticipated thermal developments in the mass concrete elements for all expected project temperature ranges using the proposed mix design, casting procedures, and materials. Use a Specialty Engineer following the procedure outlined in Section 207 of the ACI Manual of Concrete Practice to formulate, implement, administer and monitor a temperature control plan, making adjustments as necessary to ensure compliance with the Contract Documents. Describe the measures and procedures intended for use to maintain a temperature differential of 35°F [20°C] or less between the interior core center and exterior surface(s) of the designated mass concrete elements during curing. Submit both the mass concrete mix design and the proposed mass concrete plan to monitor and control the temperature differential to the Engineer for acceptance. The Engineer will review the submittal for acceptance within ten working days of receipt. Provide temperature monitoring devices to record temperature development between the interior core center and exterior surface(s) of the elements in accordance with the accepted mass concrete plan. For the first placement of each size and type mass component, the Specialty Engineer, or a qualified technician employed by the Specialty Engineer, must personally inspect and approve the installation of monitoring devices and verify that the process for recording temperature readings is effective and accurate. For placements other then the first, designate an employee(s) approved by the Specialty Engineer as qualified, to inspect monitoring device installation, to record temperature readings, to be in contact at all times with the Specialty Engineer if adjustments must be made as a result of the temperature differential being exceeded, and to immediately implement adjustments to temperature control measures as directed by the Specialty Engineer. Read the monitoring devices and record the readings at intervals no greater than 6-hours. The readings will begin when the mass concrete placement is complete and continue until the maximum temperature differential (not maximum temperature) is reached and a decreasing temperature differential is confirmed as defined in the temperature control plan. Furnish a copy of all temperature readings to the Engineer and Specialty Engineer as soon as they become available. If the 35°F [20°C] differential has been exceeded, take immediate action, as directed by the Specialty Engineer who must be available for immediate consultation at any time, to retard further growth of the temperature differential. Use a Specialty Engineer to revise the previously accepted plan to ensure compliance on future placements. Do not place any mass concrete until the Engineer has accepted the mass concrete plan(s). When mass concrete temperature differentials are exceeded provide all analyses and test results deemed necessary by the Engineer for determining the structural integrity and durability of the mass concrete element, to the satisfaction of the Engineer. The Department will make no compensation, either monetary or time, for the analyses or tests or any impacts upon the project.

Attachment 10 - 3 - 4 - 2 CPAM SECTION 10.3 -- FLOW CHART PROCESS 2 CEI VERIFICATION * PROCESS FOR CONTRACTOR MASS CONCRETE TEMPERATURE MONITORING



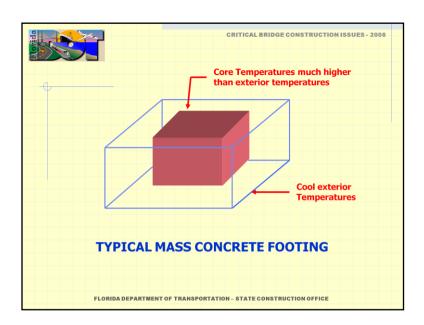
ACRONYM KEY

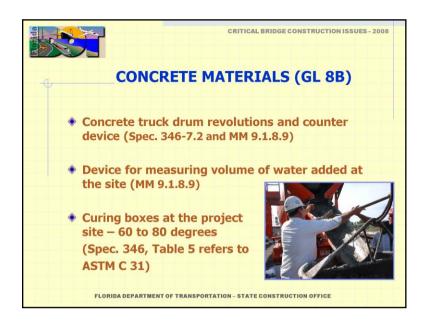
CEI —— Construction Engineering and Inspection MCTM — Mass Concrete Temperature Monitoring

PC ---- Prime Contractor SE ----- Specialty Engineer

* Each step in this process should be verified by CEI staff

**Examples of Temperature Control Measures include insulating blankets, external heat application and cooled mixing

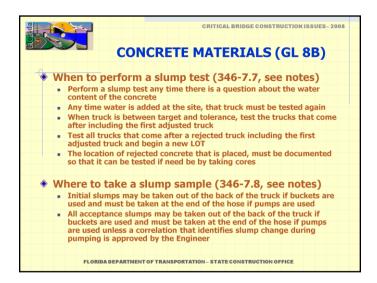




346-7.2 Transit Mixing: When water is added at the job site, mix the concrete 30 additional mixing revolutions. When mixing for the purpose of adjusting consistency, do not allow the total number of revolutions at mixing speed to exceed 160. Discharge all concrete from truck mixers before total drum revolutions exceed 300.

Materials Manual 9.1.8.9 Truck Mixer

All truck mixers must meet the requirements of Specification Section 346. Truck mixers meeting these requirements will be issued an identification card by the District Materials Engineer upon request from the concrete producer, Identification cards shall be displayed in the truck cab when delivering concrete for Department use. Failure to display the identification card in the truck cab shall be cause for rejection of the delivered concrete. The identification cards may be removed by the Engineer when a truck mixer is discovered to be in noncompliance. As an exception to the above, when the deficiency involves only an inoperable revolution counter, the truck mixer identification card will not be removed. However, the deficiency will be noted on the card by the Engineer. The Producer will be allowed to deposit the concrete in the mixer, and the truck mixer will then be removed from use until the revolution counter is repaired or replaced. On the next delivery to any Department project, after repair or replacement of the counter, the truck mixer operator shall make known that the revolution counter is operable and obtain the Engineers initial on the truck mixer identification card. Without such inspection and documentation of corrective action, the Department may reject the truck mixer at any time it is again found to have an inoperable revolution counter. The revolution counter will be set to zero prior to mixing. All truck mixers shall be inspected by the Producer at least once each week for changes due to accumulation of hardened concrete or to wear of blades. The blades shall be repaired as necessary to meet the requirements of Specification Section 346. Any appreciable accumulation of hardened concrete shall be removed before any mixer may be used. Copies of the most recent water measuring equipment calibration shall be kept in the truck cab and available upon request.



346-7.7 Adding Water To Concrete at the Placement Site: Perform an initial slump before the addition of water at the job site. After adjusting the slump, perform a test to confirm that the slump of the concrete is within the target range as defined in Table 6. If the slump exceeds the target range but is within the tolerance range, that load may be accepted, but water added at the site will be reduced to maintain a slump within the target range on successive loads. If the slump is delivered within the target range, no water will be added to the load. Confirm with another test that the next load is within the target range after the addition of water at the placement site. Repeated incidents of concrete being placed outside the target range will result in revocation of that portion of the QCP. No concrete represented by plastic test results outside of the tolerance range will be accepted for placement.

346-7.8 Sample Location:

Obtain samples from the point of final placement. Where concrete buckets are used to discharge concrete directly to the point of final placement or into the hopper of a tremie pipe, samples will be obtained from the discharge of the bucket. When the concrete is discharged directly from the mixer into the bucket, with a minimal lapse of time before discharge of the bucket, samples may be obtained from the discharge of the mixer.

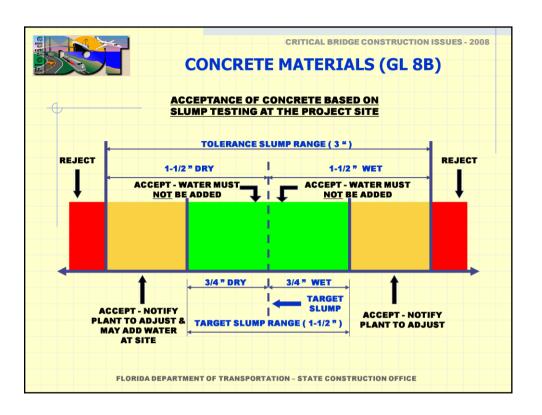
Where conveyor belts, troughs, pumps, or chutes are used to transport concrete directly to the point of final placement or into the hopper of a tremie pipe, samples will be obtained from the discharge end of the entire conveyor belt, trough, pump, or chute system.

Where concrete is placed in a drilled shaft or other element using a tremie pipe and a concrete pump, samples will be obtained from the discharge of the pump line at the location of the tremie hopper.

Where a concrete pump is used to deposit concrete directly into a drilled shaft which is a wet excavation without the use of a tremie, ensure the discharge end of the pump line remains immersed in the concrete at all times after starting concrete placement, and the following procedure is followed:

- a. Obtain initial samples from the discharge of the pump line using the full length of pump line which will be required to start the placement. Ensure the plastic properties of the concrete sampled from the discharge of the pump line are within the target range. Obtain comparative initial samples from the discharge of the mixer delivering concrete to the pump in order to control the plastic properties of the mix.
- b. Obtain all other samples from the discharge of the mixer delivering concrete to the pump. Ensure the plastic properties of the concrete being delivered to the pump are within the allowable tolerance, except when necessary and approved by the engineer and based on comparative testing, to provide concrete meeting the Specification requirements at the end of the pump line.

Describe concrete placement and sampling methods in the QCP.





MISCELLANEOUS TOPICS

- Specification 400-16.6, Concrete Curing For Traffic Barriers, Railings, Parapets And End Posts (See notes page below for Specification 400-16.6)
 - Apply curing compound within 30 minutes of extrusion as the operation progresses
 - Curing compound must remain in place for 7 full days after application (previously 72 hours)
 - The following must be reported to the Engineer:
 - How the curing compound spread rate will be determined
 - The actual curing compound quantity applied during the operation
 - Applied finish coating (Class V Finish) may be used in lieu of curing compound but curing compound must be available on site at all times as a backup system to the Class V material

FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE

400-16.6 Traffic Barriers, Railings, Parapets and End Post: Ensure concrete is cured in accordance with 400-16.2(b). When construction is by the slip form method, coat all concrete surfaces with a curing compound that meets the requirements of 925-2, either within 30 minutes of extrusion or before the loss of water sheen, whichever occurs first. Ensure a curing compound coating period of not less than seven days after application. Prior to each concrete placement, submit to the Engineer the method that will be used to periodically measure the rate of application in gallons/sq ft. Also, prior to each placement, submit to the Engineer the anticipated quantity of curing compound in gallons that will be used to meet the coverage rate specified in 400-16.2 along with the corresponding square footage of barriers, railings, parapets and end posts to be coated with that quantity. Compute the actual quantity of curing compound that is applied during each concrete placement and submit the quantity to the Engineer. Applied Finish Coatings, that are on the Qualified Products List and that are flagged as permitted for use as a curing compound, may be used in lieu of a curing compound: If an Applied Finish Coating is used in lieu of a curing compound, have a backup system that is in full compliance with 400-16.2(b) available at all times to ensure that an effective alternative system will be immediately available if the Applied Finish Coating cannot be applied within 30 minutes of extrusion or before the loss of water sheen.



MISCELLANEOUS TOPICS

- Specification 416 Installing Adhesive-bonded Anchors and Dowels for Structural Applications -416-6.1 Field Testing
 - Pullout tests required on 4%, or a minimum of 1, test per LOT (previously 10%) (see notes below)
 - If 3 consecutive LOTS pass, the sampling rate decreases to 2% than 1% (previously no reduction was permitted) (see notes below)
 - Any time there is a failure the sampling rate returns to 4% (see notes below)

FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE

416-6 Testing of Anchors or Dowels.

Field test installed anchors and dowels for traffic railing barrier applications using Type HSHV adhesives. The Engineer may also require testing of installed anchors and dowels for other applications.

416-6.1 Field Testing: Provide an Independent Testing Agency to perform field testing of the installed anchors and dowels under the direction of a Professional Engineer registered in the State of Florida. Submit test reports for each LOT signed and sealed by the Professional Engineer. Perform restrained static tension tests to prevent damage to the surrounding concrete. A restrained test is defined as a test conducted in accordance with ASTM E 488 except that the test equipment support clearance requirements of ASTM E 488 do not apply. The reaction base shall be approximately equal to the drilled hole diameter for the anchor to preclude concrete or masonry failure, but allow bond failure. Displacement measurement for field testing is not required. Test individual anchors and dowels by proof loading in tension to 85% of the Specified Bond Strength in Section 937, based on the nominal anchor or dowel diameter and embedment depth, but not more than 90% of the yield strength of the anchor or dowel, unless otherwise shown in the Contract Documents.

Divide the anchors and dowels into LOTs for testing and acceptance. Each LOT must contain a maximum of 100 anchors or dowels, of the same diameter, embedment length and Adhesive Bonding Material System. Randomly select four of the anchors and dowels in each LOT for testing, except if there are three or less in the LOT, in which case, test all anchors unless otherwise directed by the Engineer. If three consecutive LOTs have no failing tests, sample the next three LOTs at a 2% rate and if these LOTs have no failing tests, sample at a rate of 1% for the remaining LOTs unless there is a failure; however, regardless of LOT size, sample at less least one dowel per LOT. For every failed field test, perform two additional field tests on adjacent untested anchors or dowels within the LOT. Continue additional field tests until no more test failures occur, or all anchors and dowels within the LOT are tested. For the next LOT after a failed LOT, the sampling rate must be 4% but not less than one dowel per LOT and conform to the sampling rate procedure above including rate reductions as appropriate.

416-6.2 Removal & Replacement of Failed Test Specimens: Remove all anchors and dowels that fail the field test, without damage to the surrounding concrete. Redrill holes to remove adhesive bonding material residue and clean in accordance with 416-4. Reinstall new anchors and dowels in accordance with 416-5. Do not reuse the failed anchors and dowels unless approved by the Engineer. Assign reinstalled anchors into new LOTs only containing reinstalled 4160600.D03 All Jobs anchors or dowels of the same diameter, embedment length and adhesive bonding material system, and field test in accordance with 416-6.1.

CRITICAL BRIDGE CONSTRUCTION ISSUES - 2008



MISCELLANEOUS TOPICS

- Vermin screens at the base of steel poles (see notes page for new Specification 649-6)
 - Previously required grout was maintenance problem
 - New specification allows only screens unless District calls for grout in the plans



FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE

649-6 Screen Installation.

Install a screen that will prevent vermin from entering the gap between the bottom of the base plate and the top of the concrete foundation. Cover the entire gap with a wire screen, the bottom horizontal wire of which shall be in full contact with the surface of the concrete foundation and the top horizontal wire of which shall not extend beyond the top surface of the base plate. For the screen, use standard grade plain weave galvanized steel wire cloth with 1/2 inch x 1/2 inch mesh and 0.063 inch diameter wires. Vertical screen wires shall not extend beyond the top and bottom horizontal wires of the screen. Use one continuous section of screen with only one overlapping splice where the ends come together and overlap the layers 3 inches minimum. Attach the screen to the vertical side of the base plate with self-tapping stainless steel screws (#8-1/2 inch long) with stainless steel washers (1/4 inch inside diameter). Drill pilot holes into the base plate to facilitate screw installation. Install screws on 9 inch centers maximum and at least one screw shall be installed through the overlapping splice to clamp the layers together. Also clamp the overlapping splice layers together just above the concrete foundation with an all stainless steel fastener assembly consisting of a machine screw (#8-5/8 inch long), nut and 2 flat washers (1/4 inch inside diameter) and lock washer. Tightly clamp the screen layers between the flat washers



649-5 Installation.

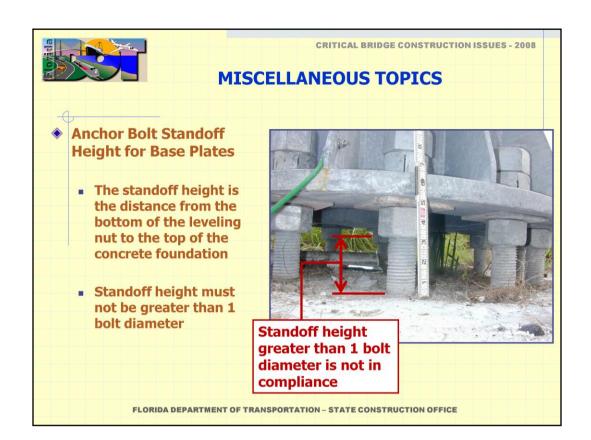
Install foundations for strain poles, mast arm and monotube assemblies in accordance with Section 455. Do not install the mast arm pole, strain poles or monotube pole until the foundation has cured for a minimum of seven days. Before erecting the pole clean the top of the foundation of any laitance, oils, grease or any other deleterious materials. Erect strain poles in an orientation which considering the rake and the application, cable forces will produce a plumb pole. Erect monotubes plumb at the time of installation. Plumb the pole supporting mast arms after the mast arms, traffic signals or sign panels have been placed.

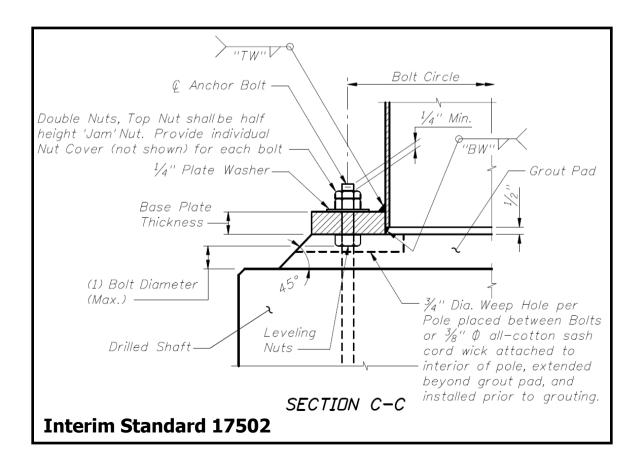
If the traffic signals and/or sign panels are not in place within two working days after the mast arm is erected, furnish and install a 3 by 2 foot blank sign panel on the bottom of each mast arm within 6 feet of the mast arm tip and plumb the pole. Re-plumb the pole supporting mast arms after installation of traffic signals and sign panels.

Install ASTM A325 bolt, nut and washer assemblies in accordance with the following. Use bolt, nut and washer assemblies that are free of rust and corrosion and that are lubricated properly as demonstrated by being able to easily hand turn the nut on the bolt thread for its entire length. Tighten nuts to the full effort of an ironworker using an ordinary spud wrench to bring the faying surfaces of the assembly into full contact which is referred to as "snug tight." After bringing the faying surfaces to a snug tight condition, tighten nuts in accordance with the turn-of-nut method in Table 460-7 of Specification 460-5. Maintain uniform contact pressure on the faying surfaces during snugging and turn-of-nut process, by using a bolt tightening pattern that balances the clamping force of each bolt, as closely as possible, with the equal clamping force of a companion bolt.

Use ASTM F1554 anchor bolt assemblies that are free of rust and corrosion, and lubricate these assemblies prior to installation so that the nut turns easily by hand the entire length of the bolt thread. Install nuts on anchor bolts in accordance with the sequence that follows.. Ensure that the base plate is level by incrementally adjusting the leveling nuts all of which must be in direct contact with the bottom surface of the base plate at the conclusion of the leveling process and. The distance from the bottom of leveling nuts to the top of the concrete foundation must not exceed one anchor bolt diameter. Tighten all the anchor bolt nuts so they are in direct contact with the top surface of the base plate and are "snug tight." Snug tight is attained by applying the full tightening effort of an ironworker using an ordinary spud wrench. If the top surface of the base plate has a slope that exceeds 1:40, use a beveled washer under the anchor bolt nut. Tighten the leveling nuts until they are snug tight. Match mark the anchor bolt nut relative to the anchor bolt to ensure that the anchor bolt nut is rotated by the fraction of a turn specified in Table A and apply the turn to the nut. Do not exceed the Table A value by more than 20 degrees. Tighten each "retainer" or "jam" nut until it is in firm contact with the top surface of the anchor bolt nut then while preventing the anchor bolt nut from rotating, tighten the jam nut until it is snug tight. During each stage of leveling nut, anchor bolt nut and jam nut tightening, use a pattern of tightening that, as nearly as possible, produces a balanced distribution of clamping forces on the base plate as tightening progresses.

Table A	
Anchor Bolt Diameter (in.)	Nut Rotation from Snug Tight Condition
≤ 1 1/2	1/3 turn
> 1 1/2	1/6 turn







Consult with the Construction Training and Qualification Manual (CTQM) for detailed information about qualification requirements

For Concrete Technician requirements review CTQM Chapter 4 at the following website:

http://www.dot.state.fl.us/construction/manuals/ctqm/new_files_0703/CTQMChap ter4.pdf

105-5.7.1 Concrete Field Technician - Level I: Ensure technicians performing plastic property testing on concrete for materials acceptance are qualified CTQP Concrete Field Technicians Level I. Plastic property testing will include but not be limited to slump, temperature, air content, water-to-cementitious materials ratio calculation, and making and curing concrete cylinders. Duties will include initial sampling and testing to confirm specification compliance prior to beginning concrete placements, ensuring timely placement of initial cure and providing for the transport of compressive strength samples to the designated laboratories. Technicians who test concrete properties or perform Verification testing for the Department must posses this qualification.

105-5.7.2 Concrete Field Technician - Level II: Ensure field technicians responsible for the quality of concrete being placed on major bridge projects are qualified CTQP Concrete Field Technicians Level II. A Level II Technician must be present on the jobsite during all concrete placements. Prior to the placement of concrete, the technician will inspect the element to be cast to ensure compliance with Contract Documents. A Level II Technician's duties may include ensuring that concrete testing, inspection, and curing in the field is performed in accordance with applicable Contract Documents. The QC Technician will inform the Verification Technician of anticipated concrete placements and LOT sizes.



CTQM - 8.8 BRIDGE COATING INSPECTOR TRAINING (Not A CTQP Qualification)

8.8.1 General

The purpose of this training course is to prepare inspectors in charge or lead inspectors on bridge coating/painting projects to effectively perform their quality assurance/control responsibilities. For all bridge coating projects, the lead inspector must have successfully completed the Bridge Coating Inspector Training Course. Lead Coating Inspectors must present their completion certificate to the appropriate FDOT official prior to the start of a bridge coating project to prove that they have received the required training. Successful completion of the Bridge Coating Inspector Training Course does not require inspectors to also be CTQP qualified as a coating inspector; therefore, inspectors that successfully complete the course **must not** apply to the CTQP administrator for qualification. **This training requirement goes into effect January 1, 2007.**

8.8.2 Bridge Coating Inspector Training Course

Lead coating inspectors must successfully complete the Society for Protective Coatings (SSPC) course entitled "Bridge Coating Inspection" which is designated as SSPC course "BCI". This is a three (3) day course and includes an examination that must be passed in order for SSPC to issue a successful completion certificate. Consult the SSPC website for when and where BCI courses are offered. Instructions for how to register for the course are also provided on this website.

http://www.sspc.org/training



Consult with the Construction Training and Qualification Manual (CTQM) for detailed information about qualification requirements

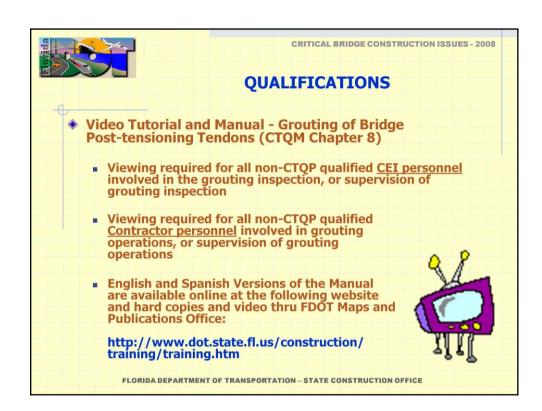
For Grouting Technician requirements review CTQM Chapter 8 at the following website:

http://www.dot.state.fl.us/construction/ctgm/new files 0703/CTQMChapter8.pdf

105-5.8.7 Post Tensioning: Perform all post-tensioning field operations under the direct supervision of a Level II Qualified Post-Tensioning and Grouting Technician qualified through the Department's Construction Training Qualification Program (CTQP). In addition, provide a minimum of two crewmembers that are CTQP Level I Qualified Post-Tensioning and Grouting Technicians. All personnel involved in grouting must attend a grouting training session provided by the Department not less then seven days prior to the start of the first stressing or grouting operation of the project.

Perform all vacuum grouting operations under the direct supervision of a crew foreman who has been trained and has experience in the use of vacuum grouting equipment and procedures. Submit the crew foreman's credentials to the Engineer prior to performing any vacuum grouting operations.

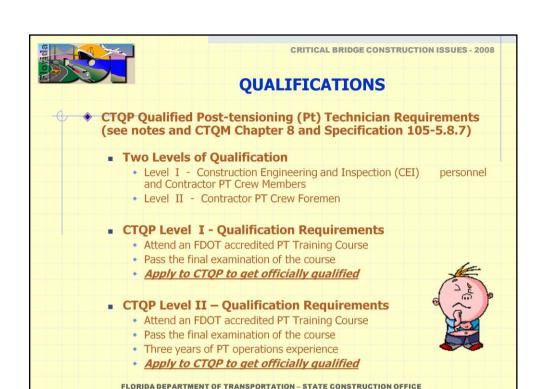
Conduct all stressing and grouting operations in the presence of the Engineer. Coordinate and schedule all post-tensioning activities to facilitate inspection by the Engineer.



105-5.8.7

All personnel involved in grouting must attend a grouting training session provided by the Department not less then seven days prior to the start of the first stressing or grouting operation of the project.

The Grouting Video must be viewed at the session required by the specification above



Consult with the Construction Training and Qualification Manual (CTQM) for detailed information about qualification requirements

For PT Technician requirements review CTQM Chapter 8 at the following website:

http://www.dot.state.fl.us/construction/ctqm/new_files_0703/CTQMCh apter8.pdf



EXPERIENCE

- Minimum Experience Requirements for Contractor Supervisors on Posttensioned Projects (Specification 105-5.8)
 - Project Engineer Registered with 5 years general bridge construction experience, 3 years of which were in Post-tensioned (PT) or Segmental construction
 - Project Manager/Superintendent Registered with 5 years or non-registered with 10 years general bridge construction experience, 3 yrs. of which were in PT or Segmental construction
 - Foremen 5 years general bridge construction, 2 years of which were in PT or Segmental construction
 - Geometry Control Engineer/Manager (Segmentals) Registered with 1 year of experience or non-registered with 3 years of geometry control experience in the casting yard and in erection of Segmentals
 - Lead Geometry Control Surveyor (Segmentals) 1 year of bridge construction surveying

FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE



EXPERIENCE

- Minimum Experience Requirements for CEI Personnel on Posttensioned Projects (CEI Scope Section 10.2)
 - Senior Project Engineer Registered with 5 years general bridge construction experience
 - Project Administrator/Manager Registered with 5 years general bridge construction and 3 years of Post-tensioning (PT) or Segmental. Nonregistered with 8 years general and 3 years PT or segmental
 - Senior Inspector 5 years general bridge construction and 2 years PT or Segmental, plus for Segmentals, 2 years of geometry control survey experience if performing casting yard inspection
 - Casting Yard Engineer/Manager (Segmentals) Registered with 1 year of casting yard experience or non-registered with 3 yrs. of casting yard experience



FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE



TRAINING

- Revision of QC Manager Training Course
 - The focus of the revised course is to teach attendees about the functions of effective QC Managers
 - New course topics that deal with QC Manager Functions are as follows:
 - · Participation in Pre-Bid planning
 - Provide awareness and interpretation of contract document requirements
 - Administer QC plan and internal work plans
 - Evaluate the QC performance of production staff
 - Administer the inspection program
 - Perform Records management
 - Monitor the QC expectations and address QC concerns of the owner
 - Establish effective lines of authority

FLORIDA DEPARTMENT OF TRANSPORTATION - STATE CONSTRUCTION OFFICE

